SEXUAL STIGMA AND EXPLANATORY MECHANISMS LINKING SEXUAL STIGMA TO HIV, STIS, AND HIV TESTING AMONG NIGERIAN MEN WHO HAVE SEX WITH MEN

by
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A dissertation submitted to Johns Hopkins University in conformity with the requirements for the degree of Doctor of Philosophy

Baltimore, Maryland
January 2016

Abstract

Statement of Problem

Although studies have found that sexual stigma affecting men who have sex with men (MSM) is associated with increased sexual risk behavior and HIV infection, few studies have assessed the pathways linked to these important outcomes. Theoretically-based models assessing these pathways would provide a better understanding of points of intervention to reduce the negative effects of sexual stigma. This is especially important for countries such as Nigeria, which have a high burden of HIV among MSM and rising levels of sexual stigma.

Methods

The sample consisted of 1,480 MSM who enrolled in a prospective cohort study in Nigeria that provided HIV/STI diagnosis and treatment from March 2013 to February 2016, called the TRUST/RV368 study. Latent variable modeling techniques were utilized to develop a measure of sexual stigma and explore pathways using structural equation modeling (SEM). In aim 1, latent class analysis was used to develop stigma classes, and predictors of class and distal outcomes were subsequently added. In aim 2, path analysis was used to test a model where disclosure led to stigma, stigma led to suicidal ideation, suicidal ideation led to condomless sex, and condomless sex led to HIV and/or STI incidence, with direct and indirect (mediational) paths tested for significance. In aim 3, latent transition analysis was used to assess if suicidal ideation modified the association between sexual stigma and HIV testing.

Results

Three stigma classes of low, medium, and high emerged. Increasing sexual stigma was associated with increasing levels of HIV/ STIs in a dose-response association. All direct relationships in the path model were significant and suicidal ideation and condomless sex partially mediated the association between stigma and HIV and/or STI incidence. Suicidal ideation and sexual stigma had a synergistic negative impact on HIV testing where the interaction effects were more strongly negative than the main effects alone.

Conclusions

Higher stigma among Nigerian MSM was associated with increased risk of HIV/ STIs. Strategies to improve MSM engagement with HIV services may need to integrate stigma mitigation strategies that address trauma and provide psychosocial support within MSM-friendly venues that approach sexual minority health holistically.

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Acknowledgements

This has been a long journey, in which I've learned so much, but I'm glad it's over. I have been lucky enough to have a lot of good people in my life that have helped me along the way to whom I owe a big THANK YOU. My mom, whether she understood what I was talking about or not, has always listened to me and been the biggest source of love and support in my life. I could not have a better mother; it's not possible. My boyfriend Gustavo has lived through this with me and deserves an honorary PhD for all the listening he's patiently done, the fixing and organizing around the apartment while I worked, and for helping me keep my mental health in check. My PhD cohort is a very special group of people. I don't know how HBS managed to get us all together at the same time, but it was magic. I wish them the best in their careers and thank them for all the great emotional support and humor we shared. I want to also thank the STI Ladies, Andrea, Sahnah, and Jenita, for the study sessions, empathy, encouragement, and fun we had. I am very thankful for my SPARC comrades, especially Cory and Lauren, who understand that only being a student without being an activist is an incomplete life and doesn't pay forward what others have worked hard for us to have. I want to thank my neighborhood, Highland Park, Los Angeles, where I grew up. I didn't see anyone with a PhD there, but I know that mine was possible because of the love my neighborhood has for its people and the kind of warmth there that can't be replicated in academia. More of my generation with be getting PhDs, MDs, MPHs, and more, and will be able to mentor the next generation of Latino/a/x youth growing up in cities across the US.

My advisor Danielle has been a wonderful advisor. Always pushing me to do better while simultaneously cheerleading for me. When I hear some of the stories of

other people's advisors, I consider myself very lucky. I want to thank Man and Becca at IHV for all the mentorship and time they gave to helping me grow as a researcher. You have shown a lot of confidence in me and treated me as an equal, which I really appreciate. I want to thank Rashelle who has met with me countless times to help me with methods that I would not have been able to figure out alone. Considering how few professors at Hopkins understand these methods in depth, and how some that do don't work with students any longer, the fact that you are still helping students new to these methods is inspiring. I thank all the professors who were passionate about teaching and mentoring in an environment that doesn't pay them to do that. The amount I've learned from these individuals is not quantifiable.

For everyone else that has touched me in some positive way, thank you. This PhD chapter has been memorable and has equipped me with the tools and the mindset to go out into the world and tackle anything.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction and Literature Review

Historical and cultural contexts of same-sex practices

It is important to understand the historical and cultural contexts in which stigma affecting sexual minorities has evolved and been globalized. This helps to situate stigma as a socio-structural process that impacts sexual minorities across a variety of life domains, and thus resembles other persistent fundamental causes of population health widely recognized to be important such as socio-economic status.[1] In P. Conrad and J.W. Schneider's book *Deviance and medicalization: From badness to sickness*, the authors document the history of how same-sex practices have been viewed and treated in Western society.[2] Same-sex practices were originally viewed as a religious transgression and sin, later treated as a crime by the end of the medieval period and in modern society redefined as a sickness. Starting in the latter 19th century, physicians and psychiatrists began to use the term "homosexuality," address it openly and directly, and view it as a serious medical pathology in need of medical treatment. Other individuals within and without the medical professions resisted this pathologizing of same-sex practices and sought to demonstrate that same-sex practices were more common than previously thought and that "homosexuals" were in fact generally healthy and happy human beings, essentially to view same-sex practices as a variant of "normal" sexual practices.

In the 1950s began what Conrad et al. call the beginning of homosexual consciousness where a number of secrete societies began to provide assistance to sexual minorities and to redefine what is meant to be a homosexual.[2] This was the beginning of the gay liberation movement. Following these earlier years of activism to move beliefs on same-sex practices away from one-dimensional images imposed by traditional and medical definitions, sexual minority activists and their allies began a politics of confrontation as well as legitimization. This resulted in such notable events as the Stonewall Rebellion in 1969, the removal of homosexuality from the Diagnostic and Statistical Manual in 1974, and court cases that challenged anti-sodomy laws in the 1980s. The liberationist approaches of sexual minority activists made same-sex practices a focus of public discourse and defined sexual minorities as a group struggling for civil rights with a public identity based on group membership.[3] These experiences laid the foundation for strategies that proved effective in advocating for resources when the HIV/AIDS epidemic began. The epidemic has been transformational in that it has made sexual minorities much more visible through intensified media coverage, greater disclosure of same-sex practices by sexual minority individuals in response to the epidemic, and the creation of large publically funded research and public health programs to address HIV/AIDS. But, as public understandings of sexual minorities have become more nuanced, the importance of gender conformity remains relatively unchanged.[3] This has resulted in greater acceptance for sexual minorities whose outward appearance and behavior conform to cultural conceptions of masculinity and femininity while those whose behavior and appearance defy gender norms, such as transgender individuals, continue to face severe levels of oppression.

Although much of what we know about traditional and changing societal perspectives on same-sex practices comes from Western cultures, there is increasing discussion of the long-standing tradition of same-sex practices throughout Africa and the impact of colonial governments on discourses around sexuality.[4] Many African countries that today criminalize same-sex practices adopted these laws under colonial powers, the same colonial powers that later decriminalized such laws in their own countries while leaving criminalization as a legacy in the countries they formally controlled.[5] In *Blackmail in Zimbabwe: Troubling narratives of sexuality and human rights*, Oliver Phillips wrote that sexual relations are symbolic of broader social relations and that women's bodies were used to privilege white males as part of legal and historical developments in Zimbabwe that produced a particular post-colonial legacy. The British passed laws in Zimbabwe to prohibit sexual relations between black men and white women while applying no constraints on white men's relations with black women. Other laws enforced by the British to protect young girls from early marriage and giving women rights that usurped the rights of the family heads to control the sexual choices of members of their households began a shift from lineage membership to state regulation. Dynamics such as this in many parts of Africa led to tensions between asserting traditional lineage-based cultures that prioritized collective interests and ethnic sovereignty and the political culture of modern nation-states where the rights of individuals were ratified by the state. The condemnation of same-sex practices is a reflection of this conflict around sexuality and gender that is a legacy of the tension between "primal sovereignty and radical individualism."

Coincident with the rise of the visibility of sexual minorities in the West and the importance of HIV/AIDS in global health and development programs, has been an increase in criminalization and social sanction of same-sex practices in many low and middle income countries (LMICs). In a number of African countries, same-sex practices are viewed as un-African, an import from the West, and not behavior that in fact has long-standing roots in the continent.[5] The increasing "anti-gay" rhetoric throughout Africa has given rise to increases in arrests of individuals for consensual same-sex sexual acts and a number of new laws which broaden the scope of criminalization.[6] These trends in negative perceptions of sexual minorities within Africa are due to the colonial legacy previously described, the growing visibility of mostly white MSM in high-income countries which has led some to associate same-sex practices with former colonial powers, the perception that HIV/AIDS is a "gay" disease, and a rise in patriarchal and religious conservatism.[7–9] T. Msibi contextualizes what some view as a clash between Western and African treatment of same-sex practices by highlighting that the primary difference between the two regions is not whether same-sex practices have existed but the different social constructions of same-sex practices in these two regions, proposing that we develop approaches that address the intersection of gender and sexual orientation and that are more Africa-centered.[9]

Nigeria reflects the broader patterns seen in other African countries. Traditionally tolerated same-sex practices have been documented among the Yan Daudu in Hausa-speaking northern Nigeria and marriage between women among the Igbo in south-central Nigeria. Yan Daudu were "cross-dressers," engaged in sex with men, and often engaged in activities typically associated with women.[4] They often

married women and had children. And yet Nigerian leaders have since the 1990s intensified their anti-same-sex practices rhetoric such as former President Obasanjo who stated in 2004 that "homosexuality is unnatural, ungodly, and un-African."[9] Qualitative work occurring in the same time period as Obasanjo's statements described MSM social networks in the early 2000s that were hidden and facing high levels of social ostracization by Nigerian culture, religion, and political will.[10] In a 2007 Global Attitudes report, 97% of Nigerians were opposed to homosexuality, highlighting that the President's statements were largely in accord with social attitudes.[7]

In January 2014, Nigeria passed a law further criminalizing same-sex behavior.[11] Prior to the law, same-sex marriages would have been deemed void but would not have resulted in criminal penalties.[6] The new law imposed a penalty of 14 years of imprisonment for same-sex marriages and also prohibited the registration and meetings of "gay clubs, societies and organizations." A study of its effects found that MSM reported fear of seeking healthcare and avoidance of healthcare at significantly higher levels post-law as compared to pre-law.[11] A number of researchers have called for a better understanding of the impact that the intersection of ideologies on gender and sexuality have had on negative treatment of sexual minorities and this is especially relevant for Nigeria.[3,9,12] In her paper titled *Patriarchal ideology and discourses of sexuality in Nigeria*, C. Otutubikey Izugbara wrote that in Nigeria children from a young age are socialized to accept male and female roles that privilege traditional notions of masculinity, with heterosexuality celebrated as the natural order. Femininity is associated with vulnerability and weakness and therefore males taking on the role of females, as males engaging in same-sex practices are often perceived, is considered the

ultimate humiliation and transgression, as well as unproductive and unnatural. More recent data on human rights abuses enacted on MSM in Nigeria demonstrate continuing high levels of aggression (36%), alienation (30%), and verbal abuse (19%).[13] In some respects, the situation for Nigerian sexual minorities today is reminiscent of that of sexual minorities in the US in the 1970s and 1980s, where activism was growing as was victimization of individuals perceived to engage in same-sex practices within a largely disapproving societal contexts that offered little public resources or other help to sexual minorities.[3]

Theory: Social-psychological perspectives on stigma

General stigma processes

With the publication of his seminal book in 1963, *Stigma: Notes on the management of spoiled identity*, sociologist Erving Goffman laid out key theory around stigma and gave rise to a new popularity in stigma research that continues today.[14] His definition of stigma remains the most commonly used and says that stigma is a discrediting attribute that is incongruous with our stereotypes of an individual.[14,15] According to Goffman, the stigmatized individual is not believed to be quite human by the non-stigmatized, the "normals," and as a result of the stigmatized and the non-stigmatized holding the same identity beliefs, stigmatized individuals feel shame. Therefore, the central dilemma for stigmatized individuals is that of acceptance. Although Goffman did not specifically focus much of his writing on sexual minorities he did write on the importance of having a concealable stigma and these writings are very

applicable to the study of stigma affecting sexual minorities. He called those individuals whose stigma is not visibly apparent "the discreditable" and wrote that their primary concern is to manage knowledge of their stigma.

Goffman believed that due to the rewards of being considered "normal," almost all stigmatized individuals in a position to conceal their stigma would do so on some occasion. The precariousness of such individuals' positions has various implications. Close relationships may be difficult as stigmatized individuals try to not have their stigma revealed and they may be more psychologically distressed in social situations in ways that heterosexuals generally are not; the stigmatized individual will be "alive to the situation as a scanner of possibilities and therefore likely to be alienated from the simpler world in which those around him apparently dwell." Stigmatized individuals are presented with a code of conduct from their peers and one from the non-stigmatized. The first is largely political as it tries to present the stigmatized to the rest of society in the best light, while the second is couched in rhetoric around mental hygiene where the stigmatized individual is expected to show a "good adjustment" to their condition. The "good adjustment" has several implications for the non-stigmatized, which are important for the continued perpetuation of stigma. It means that the unfairness and pain of being stigmatized will never be presented to the non-stigmatized; it means that the non-stigmatized will not have to admit to themselves how limited their tactfulness and tolerance is, and it means that they can remain relatively uncontaminated by intimate contact with the stigmatized, relatively unthreatened in their identity beliefs. If the stigmatized individual complies with both codes of conduct they are said to have come to terms with themselves and are a whole

person with dignity and self-respect. His writings elucidate some reasons why the field of mental health has become so central to the lives of sexual minorities.

In 2001, Link and Phelan published a paper critiquing conceptualizations and research around stigma and proposed a definition that expanded on Goffman's.[15] Their primary critiques were that a great deal of variability exists in definitions of stigma, that researchers of stigma often use theory uninformed by the lived experiences of the people they study, and that stigma research is usually focused on the individual rather than structural level. They defined stigma as the convergence of several components within the context of a power differential. These components are: people distinguish and label human differences; dominant cultural beliefs link labeled individuals to undesirable characteristics creating negative stereotypes; labeled individuals are placed in categories in order to separate "us" from "them," and lastly that labeled individuals experience status loss and discrimination that lead to unequal outcomes. Stigma is a persistent predicament because mechanisms for achieving discriminatory outcomes are flexible and extensive, and because stigma is associated with a multitude of outcomes, accounting for why stigmatized individuals are disadvantaged in a broad range of life domains. They advocated for researchers to study multiple causes and outcomes of stigma and to consider stigma a fundamental cause of health as important as many that have received more attention.[1,15] Stigmatizing others enables the majority to achieve ends they desire, which are to keep people down (exploitation), keep people in (norm enforcement), and keep people away (disease avoidance).[1] This is particularly relevant to the post-colonial contexts in a number of African countries where same-sex practices are constructed as an infringement on sovereign countries that prioritize

lineage-based cultures and where maintenance of this social norm is important for political, economic, and cultural reasons.[5]

Stigma processes affecting sexual minorities: a move away from homophobia

Theoretical writings on stigma affecting sexual minorities have incorporated the work on general stigma processes developed by social psychologists. Gregory M. Herek argued for a move away from the term "homophobia," which focuses on individual fear of sexual minorities that is pathological or irrational. In his and Kevin T. Berrill's 1992 book, *Hate crimes: Confronting violence against lesbians and gay men*, Herek and coauthors wrote that stigma manifests itself in heterosexism, a cultural ideology embodied in institutional practices that work to the disadvantage of sexual minority groups even in the absence of individual prejudice and discrimination and which were fostered from traditional ideologies related to sexuality and gender.[3] Heterosexism promotes the assumption where all people are presumed to be heterosexual, rendering sexual minorities invisible in most situations. When sexual minorities become visible, heterosexism problematizes them. They are presumed to be abnormal and therefore inferior, making them appropriate targets for hostility and aggression. He and coauthors documented that levels of "anti-gay violence" towards sexual minorities, later called enacted stigma, were very high and had increased in severity over time in the US in the 1980s. They also emphasized the mental health impacts of victimization on individuals generally and sexual minorities in particular, but at the time of the book's publication, the authors did not believe that sexual minorities had worse mental health than heterosexuals. The high levels of stigma experienced by MSM in the US that they

found through convenience samples in the 1980s were further confirmed in 2009 using a national probability sample.[16]

In 2007, he published a paper further explicating his conceptual framework for what he calls sexual stigma, which manifests itself as heterosexism at the societal level and at the individual level manifests itself as enacted, felt, and internalized stigma.[17] This paper built off the work of social psychologists such as Link and Phelan. Enacted stigma refers to overt behavioral expressions of sexual stigma through actions such as antigay epithets, shunning and ostracism of sexual minorities and overt discrimination and violence. Enacted stigma such as hate crimes exact a significant psychological toll and hate crimes are associated with greater psychological trauma for the victims than are other kinds of victims of crime. Felt stigma is an individual's expectations about the probability that sexual stigma will be enacted in different situations. It motivates sexual minority individuals to use various stigma management strategies, such as avoiding health care providers who may stigmatize them. Although coping strategies can reduce one's risk for discrimination and attack, they can also significantly disrupt the lives of stigmatized individuals, limit their behavioral options, reduce their opportunities for social support, heighten their psychological distress, and increase their risk for physical illness. Internalized stigma is an individual's personal acceptance of sexual stigma as a part of their own value system and self-concept. Internalized stigma is in part controversial as some have criticized it as reproducing the emphasis on individual pathology.[7]

Stigma processes affecting sexual minorities: perspectives that emphasize psychological processes

First hypothesized in the mid-nineties and more fully explicated as a theoretical model in 2003 is Meyer's Minority Stress Model.[18,19] It has been one of the most influential stigma theories to emerge directly relevant to sexual minorities and has been adapted to many contexts.[20–22] Meyer defines stress as "any condition having the potential to arouse the adaptive machinery of the individual." The deprivation of a sense of harmony with one's environment is considered the source of minority stress. The assumptions underlying the model are that minority stress is unique and additive to general stressors; minority stress is chronic, and minority stress is socially based rather than stemming from the individual. In addition to general stressors, sexual minorities experience minority stress (distal stressors and proximal stressors) as a result of their sexual minority status and identity. These stressors all impact mental health, but are moderated by resilience and social connection to similar others. Distal stressors are defined as objective events, such as discrimination, and proximal stressors are defined as subjective because they rely on individual perceptions, such as internalized stigma. The stressors are shown as overlapping to represent their interdependency. For example, experiencing antigay violence, a distal stressor, is likely to increase vigilance, expectations of rejection, and concealment of stigma, proximal stressors. While this model has been used extensively to explain mental health outcomes in sexual minority populations, much of it is also applicable to other types of health outcomes. In 2009, Mark L. Hatzenbuehler expanded on the Minority Stress Model with the psychological mediation framework.[23] In his framework, stigma-related

stressors cause sexual minorities to be more vulnerable to general psychological processes that are known to predict psychopathology in heterosexuals. His theory stated that stigma-related stressors impact emotion regulation and social/interpersonal and cognitive psychological processes. Cognitive processes, such as hopelessness, are especially relevant to whether sexual minorities access health services and engage in preventative health behavior.

Next steps

Theoretical developments in the field of stigma have been extremely important to understanding that stigma should be viewed as a social determinant of health as any other, consisting of multiple mutually reinforcing mechanisms that in combination affect an array of health outcomes.[1,15] In this dissertation the term "sexual stigma" will be used and it encompasses multiple theoretical perspectives. Sexual stigma is a social process affecting sexual minorities that involves the convergence of labeling, stereotyping, separation, status loss, and discrimination that co-occur in a situation of power imbalance.[15] Sexual stigma manifests itself at the structural level through heterosexism and at the individual level through enacted, felt, and internalized stigma.[17] This dissertation will focus on the health of MSM. The strong link between sexual stigma and mental health among MSM has helped us to understand why stigma is associated with poor health, but currently more work is needed to understand what lies beyond poor mental health. There is a paucity of theoretically-based models consisting of stigma, poor mental health and HIV-related outcomes. Given that the UNAIDS Fast-track Targets include "zero discrimination" and that MSM face a disproportionate

burden of HIV globally, it is imperative that we better understand the link between sexual stigma and HIV.

Prevalence and measurement of sexual stigma in sub-Saharan Africa (SSA)

Prevalence of sexual stigma

Link and Phelan recommend research on stigma that studies multiple manifestations of stigma and multiple outcomes as they believe that stigma persists in part because it manifests itself through a flexible package of mutually reinforcing mechanisms.[15] In support of this, a variety of sexual stigma mechanisms have been found to be common across SSA within the broad domains of: family and friends, health care, police, public settings, verbal harassment, blackmail, physical violence, and rape.

Family and friends

In Senegal, 49% of MSM had experienced verbal abuse from their families.[24] In Malawi, 26% of MSM felt excluded from family gatherings and 27% felt rejected by friends.[25] A recent review of stigma found the combined prevalence of family exclusion to be 31% in the US, 14% in Southern Africa, and 9% in West Africa, family gossip to be 50% in the US, 20% in Southern Africa, and 22% in West Africa, and friend rejection to be 28% in the US, 19% in Southern Africa, and 18% in West Africa.[26]

Health care settings

Evidence from SSA suggests that MSM are facing considerable enacted and felt sexual stigma in regards to health care. The most common is that MSM are afraid to

seek health care services. Estimates of fear of seeking health care from seven SSA countries ranged from 8%-62%[25,27–30] and in the study comparing across regions fear of seeking health care was 27% in the US, 22% in Southern Africa, and 22% in West Africa.[26] Studies have also highlighted that some MSM have concerns with quality of services they received[28–30] and accessibility.[29] MSM reported being treated badly by health care providers once they learned they were MSM in a qualitative study in South Africa.[31] In another qualitative study in South Africa, all participants had experienced or witnessed gossip and homophobic verbal harassment from health care workers.[32] Feminine-appearing MSM and MSM presenting with a rectal STI were especially vulnerable.

Police

MSM have reported being arrested on false charges, experiencing physical violence from police, and having been in jail.[24,25,27,30] MSM reported that violence was a common experience and they felt that they could not bring such incidents to the authorities.[33] Many had experienced a lack of police protection as a result of their sexuality. In the study comparing across regions police refusal to protect was 13% in the US, 7% in Southern Africa, and 7% in West Africa.[26]

Stigma in public settings

The prevalence of fear of walking around in public places varies broadly among SSA MSM from 2% in Togo to 44% in Swaziland.[27,29,30] In a study comparing across

regions, fear of being in public was 32% in the US, 23% in Southern Africa, and 13% in West Africa.[26]

Verbal harassment

Verbal harassment is generally the most common stigma mechanism ranging from 13% in Togo to 49% in Tanzania.[29,34] In the study comparing across regions verbal harassment was 57% in the US, 39% in Southern Africa, and 28% in West Africa.[26]

Blackmail

Estimates of blackmail across seven SSA countries ranged from 11%-40%[27–29] and it was the most common human rights abuse reported in a study of MSM in Southern and Eastern African countries.[27] According to a report on blackmail in SSA, blackmail and extortion are perhaps the most prevalent and least visible of human rights violations aimed at sexual minorities, and in contexts where same sex behavior is criminalized, such as Nigeria, many fear reporting blackmail to the police as that may reveal their same sex practices.[5] Blackmail "involves threats to disclose information that a person believes to be potentially damaging to their reputation or safety" and it frequently involves extortion.[5] In the study comparing across regions blackmail was 10% in the US, 20% in Southern Africa, and 20% in West Africa.[26]

Physical violence

Estimates of having experienced physical violence among MSM across nine countries ranged from 9%-36%[13,25,28–30,34,35] and reporting that violence was the biggest

threat to health ranged from 4%-15% in Malawi, Namibia, and Botswana.[27] In the study comparing across regions lifetime experience being physically hurt was 19% in the US, 13% in Southern Africa, and 12% in West Africa.[26] In a qualitative study in Swaziland, MSM reported that violence was a common experience and they felt that they could not bring such incidents to the authorities.[33]

Rape

Rape or forced sex of MSM has also been reported as disturbingly common. Estimates of ever having been raped in nine SSA countries ranged from 6%-43%,[13,24,25,28–30,34] with 37% of MSM having been raped in the last 12 months in Nigeria and Senegal.[24,36] In Burkina Faso, 15-16% of MSM reported forced sex, but among participants with HIV, levels were 20%-44%.[29] In the study comparing across regions the prevalence of rape was 7% in the US, 7% in Southern Africa, and 12% in West Africa.[26]

Stigma Measurement

There have been a number of different approaches to measurement of sexual stigma with no consistent approach across studies. This is a problem that has also been noted for the measurement of HIV-related stigma.[37] Some studies use the approach of utilizing only one indicator of stigma composed of one question[38] or one indicator composed of an endorsement of any of several stigma mechanisms.[39,40] The first example is problematic in that one mechanism of stigma is unlikely to capture the variable stigma mechanisms that stigmatized individuals are likely to experience and

the second treats sexual stigma mechanisms as if they are interchangeable. A more common approach is to ask about multiple stigma mechanisms and then to create a continuous stigma score where individual items are added up, also called a summary score. Summary scores may be collapsed into categorical variables,[34,41] but a limitation of this approach is that there are often no clear guidelines regarding where to place cut-offs which can impose differences in stigma groups that may not be meaningful and could result in classification errors.[42] Summary score approaches derived from exploratory factor analysis[43] also have limitations. This approach assumes that the relationships between each stigma indicator and the latent stigma factor are equal when substantial inequality often exists among factor loadings.[44] Another limitation of this approach is that it overlooks the possibility that important and recurring combinations of stigma factors exist with meaningful and unique associations with risk. Stark et al. gives the example that a summary score totaling to three could be achieved in multiple ways. Applied to sexual stigma, a score of three could reflect the experience of sexual, physical, and verbal stigma mechanisms for one person while a score of three could reflect the experience of family-related stigma, blackmail, and police-related stigma for another individual. More recently sexual stigma latent factors have been utilized in structural equation modeling.[45] While this is an improvement in that it does account for measurement error, factor analysis emphasizes identifying relations between variables, assuming that these relations apply across all people.[46]

The question of whether meaningful patterns of stigma exist within a population can be answered using latent class analysis (LCA). Because sexual stigma is a social process and may manifest itself through a variety of mutually reinforcing mechanisms,

adopting a person-centered latent modeling approach such as LCA will better account for various negative experiences related to same-sex practices that individually differ between MSM.[15,47] The advantage of LCA is that it identifies patterns of responses across individuals in order to find meaningful homogeneous groups that would be difficult to discern by assessing stigma indicators separately.[46] Additionally, the extraction of these stigma subgroups, or classes, would be meaningful because we would be able to assess their prevalence in the sample; we would understand which participant characteristics are associated with subgroup membership; and applying LCA as the measurement model in a structural equation model (SEM) would enable us to understand if health outcomes differ by subgroup. The strengths of person-centered modeling methods would contribute to a better understanding of sexual stigma and a greater ability to decide what interventions may be most appropriate to combat it. For example, studies of bullying among American youth utilizing LCA have found that youth bullied due to their perceived sexual orientation were also very likely to experience all other forms of bullying and that youth in a sexual orientation discrimination class had a higher odds of engaging in deliberate self-harm and had higher depressive symptoms compared to the low discrimination class.[48,49]

Next steps

The evidence that exists on sexual stigma affecting MSM in SSA suggests that lifetime experience of sexual stigma is high across contexts, but it is difficult to assess the frequency with which sexual stigma affects MSM as most studies only report lifetime exposure. Overall, the most common mechanisms of stigma are physical

violence, rape, blackmail, and fear of seeking health care. The strengths of the existing literature are that they demonstrate descriptively that multiple mechanisms of stigma are experienced by MSM in SSA. Increasingly there is a move in the direction of conceptualizing sexual stigma as a latent or unobserved variable, which more accurately reflects that stigma is a social process that may vary in its manifestations across people, time, and space. A promising approach to assessing sexual stigma would be to use latent class analysis. Although the use of latent class analysis for other constructs, particularly in the field of mental health, is widely used, very few studies use this person-centered approach when assessing sexual stigma. A person-centered approach can address the limitations of factor analysis previously outlined while also having the methodological benefits of treating sexual stigma as a latent variable and utilizing such measures within SEM.

Sexual stigma and HIV/STIs

Few studies have assessed the link between mechanisms or manifestations of sexual stigma and HIV prevalence among MSM in SSA. Several studies have found a positive association[34,36,39] while others have not found a significant association.[43] Each of these studies measured sexual stigma in different ways, making it difficult to compare them to each other. Even less is known about the relationship between sexual stigma and sexually transmitted infections (STIs), but this is also important to assess as STIs increase one's risk of developing harmful sequelae and of contracting HIV.[50,51] One study of violence towards MSM across five Central American countries found that

violence was positively associated with reported STI diagnosis or symptoms,[52] but limitations of this study are that the violence experienced by MSM was not specific to sexual stigma and the study did not test for STIs. A study of sexual minority women in Michigan found that sexual orientation discrimination was positively associated with a latent syndemic factor which included a history of STIs.[53] This study was not among MSM and we cannot tease out the relationship between sexual stigma and STIs from its association with the other variables in the syndemic factor. A study of internalized stigma affecting young black MSM in the US found no association with chlamydia and gonorrhea and a negative association with syphilis.[54] Overall, it is inconclusive whether sexual stigma is positively associated with robust measures of HIV and STIs. Some of the primary reasons for this may be due to insufficient sample sizes, self-reported infection, imprecise measurement of sexual stigma, and temporal ambiguity between predictors and outcomes in cross-sectional studies.[43]

One important way to strengthen the evidence base showing that sexual stigma contributes to HIV and STIs would be to assess its association with HIV and STI incidence. To the best of my knowledge, I am not aware of any studies that have done this. A lack of longitudinal data limits our understanding of the contribution of sexual stigma towards onward transmission. Evidence that stigma is associated with incident infection would strengthen the argument that stigma plays a causal role in onward transmission. Understanding what drives HIV incidence among MSM is especially important to understand in order to address the rising levels of HIV among MSM in multiple countries. A recent review of HIV incidence among MSM globally found that HIV incidence levels were similarly high across countries of varying income levels, but

this review did not include any studies of incidence among Nigerian MSM.[55] After South Africa, Nigeria has the second highest number of people living with HIV/AIDS in SSA with 3% of adults in Nigeria HIV infected.[56] This is in part due to its very large population size. Nigeria's population accounts for 47% of West Africa's population,[57] therefore it is important to better understand drivers of HIV and STI incidence in this country.

Explanatory Mechanisms for HIV and STIs

Low levels of condomless sex between MSM puts MSM in Nigeria at great risk of contracting HIV/STIs. Levels of condomless sex among MSM has been found to be as high as 31%-62% in Lagos and Abuja, Nigeria.[58–60] Factors that have been found to be associated with condomless sex among Nigerian MSM include city of residence, bisexual sexual orientation or sexual behavior, HIV infection, and never having been tested for HIV.[61] More recently studies of sexual stigma in SSA have begun to advance our understanding of the connection between sexual stigma and sexual risk behavior that puts MSM at risk of contracting HIV and STIs via psycho-social processes.[40,43,62] These are much needed advances as they explicate more targeted intervention strategies that could be utilized to address low levels of condom use among Nigerian MSM.

Stigma-Mental Health Relationship

Meta-analyses have found that MSM have significantly higher levels of psychological distress, including higher levels of depressive symptoms and suicidality,

than do heterosexuals,[19,63,64] although a major limitation of this body of literature is that most studies have assessed mental health in sexual minorities in high-income countries,. While this has been important work for recognizing the need to address poor mental health among sexual minorities, much more evidence is needed regarding the mental health of sexual minorities in LMICs. A systematic review found that suicide attempts were higher among MSM than heterosexual men in North America, South America, Asia, and Australia, but this study did not include MSM in Africa.[65] There is growing evidence that poor mental health is a significant problem for MSM in SSA. Levels of high depressive symptoms among MSM have been reported as 16% in Lesotho,[45] 44% in South Africa,[66] and 58% in Swaziland.[30] Levels of suicidal ideation among MSM have been reported as 56% in South Africa,[66] 37% in Swaziland,[30] and 44% in Uganda.[67]

A number of studies have shown a direct positive relationship between stigma and poor mental health. In a national sample from the US, sexual minorities living in communities with high levels of anti-gay prejudice had a higher hazard of mortality than those not living in such communities, which translated into a shorter life expectancy by 12 years.[68] Specific causes of death for these sexual minorities revealed that suicide was substantially elevated. A study of MSM in China found that 68% reported previous suicidal ideation and attempts and self-objection to homosexuality, illegal status of gay marriage in China, and disclosure of homosexuality were significantly associated with suicidal behaviors.[69] A study of gay men in New York City found that internalized stigma, expectations of rejection and stigma, and having

experienced discrimination and violence were each associated with a range of psychological distress indicators, including suicidal ideation.[18]

Stigma-Sexual Risk Behavior Relationship

It is likely that one intermediary factor in the stigma-HIV/STI relationship is condomless sex as it is the single most important factor for HIV/STI transmission.[70] Anal intercourse has a transmission efficiency for HIV roughly 18-fold higher than that for vaginal intercourse.[71] Although condoms are very effective at reducing the risk from anal intercourse, a sole focus on this individual behavior does not account for rising levels of HIV among MSM suggesting the importance of accounting for structural factors such as sexual stigma.[54,72,73] Sexual stigma has been found to be associated with condomless sex among MSM across a variety of settings, including China,[74] Uganda,[75] Vietnam,[41] and in the US.[54,76,77] The sexual stigma-sexual risk behavior association is also made more plausible by the evidence for similar constructs. Racial discrimination towards black men and intimate partner violence among MSM have both been found to be associated with increased sexual risk behavior, including condomless sex.[78,79]

Stigma-Mental Health-Sexual Risk Behavior Relationship

One possible explanation for the stigma-sexual risk behavior association could be that this relationship is mediated by psychological processes. Theoretical work has explicated some of the cognitive processes affected by stigma that may maintain or exacerbate poor mental health, including suicidality, and subsequently affect sexual

behavior.[23] Three of these cognitive processes are hopelessness, pessimism, and negative self-schemas or negative views of the self such as low self-esteem. Hopelessness is the belief that negative events will occur and there is nothing the individual can do to change the situation, while pessimistic individuals exhibit negative expectations of future outcomes across a variety of life domains. These cognitive processes may inhibit individuals from consistently using condoms by causing them to 1) feel that they do not have control over their future, 2, expect negative experiences to happen to them such as acquiring HIV, 3, care less about the consequences of their actions, and/or 4, seek out sex partners for validation and emotional contact as a coping mechanism, potentially making them more willing to engage in condomless sex.

Studies among MSM have found that psychological distress, including anxiety, depressive symptoms and suicidality, mediated the sexual stigma-sexual risk behavior association.[41,76,80] MSM experiencing poor mental health as a result of sexual stigma may use condoms less frequently because of lowered self-esteem,[81,82] feelings of hopelessness or fatalism,[23,83] a need for validation or emotional contact,[70,84] or sexual sensation seeking,[81] all of which may become barriers to the development of positive attitudes and intentions related to protective behavior. A study of nonmonogamous MSM in San Francisco, CA found that participants who had engaged in condomless sex used sex significantly more of the time to cope with stressful situations than those not reporting condomless sex.[85] And yet studies have also found poor mental health to have an insignificant or negative relationship with increased sexual risk behavior[86,87] and several studies have failed to find that mental health mediated the stigma-sexual risk

behavior association among MSM living in SSA,[40,45] suggesting a need for further research investigating this pathway.

Stigma-Mental Health-Sexual Risk Behavior-HIV/STI Pathway

Although there a number of studies linking sexual stigma to mental health and sexual-risk behavior, and linking sexual stigma to sexual risk behavior mediated by mental health, very few studies have been able to link sexual stigma to HIV/STIs by way of mental health and sexual risk behavior as mediators in a single model. Additionally, most studies that have assessed mental health as a mediator have only assessed depression and not suicidal ideation. A path analysis including transgender women from three West African countries found that a variety of sexual stigma manifestations labeled social stigma were associated with condomless sex but condomless sex did not mediate the social stigma-HIV prevalence association.[43] A study of MSM in Lesotho found that while social stigma was associated with both depression and HIV prevalence, depression did not mediate the sexual stigma-HIV prevalence association.[45] Given the lack of data finding an association between sexual stigma and HIV/STIs by way of mental health and sexual risk behavior, there is a great need for more evidence to explain how stigma impacts onward transmission of HIV and STIs.

Next steps

High levels of HIV and STIs and low levels of condom use among Nigerian MSM highlight a need to understand this dynamic better. Understanding how sexual stigma

impacts these factors among MSM is a promising and relatively understudied area of research, especially for MSM in SSA. No such studies exist for MSM in Nigeria. Thus far, very few studies have been able to show an association between sexual stigma and HIV and STIs among MSM in SSA,[34,36,39] which may be partly due to methodological issues in existing studies. More research is needed to investigate this relationship which use sound measures of sexual stigma, larger sample sizes, robust measures of HIV and STIs, and longitudinal data where temporal ordering can be established.

Sexual stigma and HIV testing

HIV testing is required in order for an individual to be aware of their HIV status and is the first step in the HIV Care Continuum.[88] The Continuum is a model that outlines the sequential steps or stages of HIV medical care from diagnosis to viral suppression. Awareness of HIV status and subsequent achievement of viral suppression greatly help HIV infected individuals live longer, healthier lives and decreases onward transmission. Individuals unaware of their HIV infection are 3.5 times more likely to transmit HIV.[89] In comparison to the literature on sexual stigma's association with other outcomes such as mental health, there are relatively few quantitative studies assessing sexual stigma's association with HIV testing. Greater sexual stigma and the existence of same-sex-practices criminalization policies are associated with less access to HIV testing in several large multi-country studies.[90–93] Some limitations of these existing studies are that MSM in SSA were either not included or under-represented in the samples, measures of sexual stigma may have been inappropriate in the African context, and these analysis generally did not look at the interrelationships of covariates.

Qualitative studies of MSM in SSA have repeatedly found that sexual stigma discouraged MSM from seeking HIV testing and care. This has been found in Uganda,[35] South Africa,[31,32] Senegal,[24] Cameroon,[94] and Swaziland.[33] Studies have shown that sexual stigma led to delayed health care seeking and development of strategies around trying to avoid stigmatizing health care workers, including traveling far to locate MSM-friendly services and non-disclosure.[27,30,32] In a qualitative study in Swaziland, HIV positive MSM felt that health care providers' questions assumed heterosexuality.[33] They felt afraid to mention male sex partners and therefore did not bring partners in for care.[32] Levels of undiagnosed HIV infection are high among Nigerian MSM,[60] highlighting the need to improve levels of HIV testing. Estimates of ever having had an HIV test among MSM range from as low as 18% in Kano in northwest Nigeria[58] to 68% in Ibadan in southwest Nigeria.[59] It may be that sexual stigma inhibits Nigerian MSM from being tested for HIV as has been found in qualitative studies of MSM in SSA. A better understanding of whether and how sexual stigma prevents Nigerian MSM from being tested would improve development of interventions to reduce the negative impacts of sexual stigma and reduce the levels of undiagnosed infection.

Explanatory mechanisms for HIV testing

The relationship between stigma, a structural factor, and HIV testing, an individual behavior, may in part be explained by intermediary psychosocial factors. Understanding which factors increase or decrease the association between sexual stigma and HIV testing will identify those that can be intervened on in order to reach the first 90 of the UNAIDS 90-90-90 targets. The association between sexual stigma and

poor mental health among MSM has been well established in western countries, but few studies have looked at the association between mental health and HIV testing among MSM. A review of studies looking at the most prevalent and interfering concerns among HIV positive individuals found that depression was predictive of non-adherence, disease progression, and reduced survival time.[95] It is possible that individuals with poor mental health may be less motivated to or capable of engaging with HIV testing as mental health problems may be a barrier to engaging in self-care health behaviors.[96] In a study of Chinese MSM, depression mediated the negative relationship between homophobia and HIV testing.[97] It may be that cognitive consequences of sexual stigma that increase sexual risk behavior also work to inhibit Nigerian MSM from obtaining HIV testing, which would further highlight the importance of addressing mental health within programs and services targeting Nigerian MSM.

Next steps

The first goal of the UNAIDS Fast Track target's is that 90% of those who are HIV infected will know their HIV status.[98] Although there is widespread awareness that HIV-related stigma impedes achievement of the 90-90-90 goals, the relationship between sexual stigma and HIV testing remains understudied despite the growing evidence that one of the primary outcomes of sexual stigma is lower access to prevention and treatment-related services. Studies are needed that reveal why HIV testing remains low among Nigerian MSM. One important factor in this association may be poor mental health. Feelings of hopelessness and fatalism may discourage Nigerian MSM from

seeking HIV testing and these negative psychological processes may be in part associated with and exacerbated by sexual stigma.

Disclosure of same-sex practices

The centrality of disclosure among individuals with a concealable stigma has long been recognized and its relationship with stigma is complex.[14,99] The concealability of same-sex practices is one of the issues that distinguish sexual stigma from that of immediately apparent stigmas, such as stigma towards racial/ethnic minorities.[17] From a theoretical perspective disclosure is likely to be a trigger for more severe stigma. While heterosexism generally renders MSM invisible and allows concepts of same-sex practices to be imbued with various pernicious symbolic statuses (e.g. deviant, evil),[3,17] disclosure disrupts and challenges these concepts. Heightened stigma often results in order to silence the offender and return to the status quo, especially in contexts that are highly stigmatizing. Alternatively, disclosure may be a positive factor as it increases visibility for sexual minorities, which has been associated with increasing tolerance of sexual minorities in high-income countries,[3] and with less psychological distress among sexual minorities who may then be under less stress to maintain secrecy.[99,100]

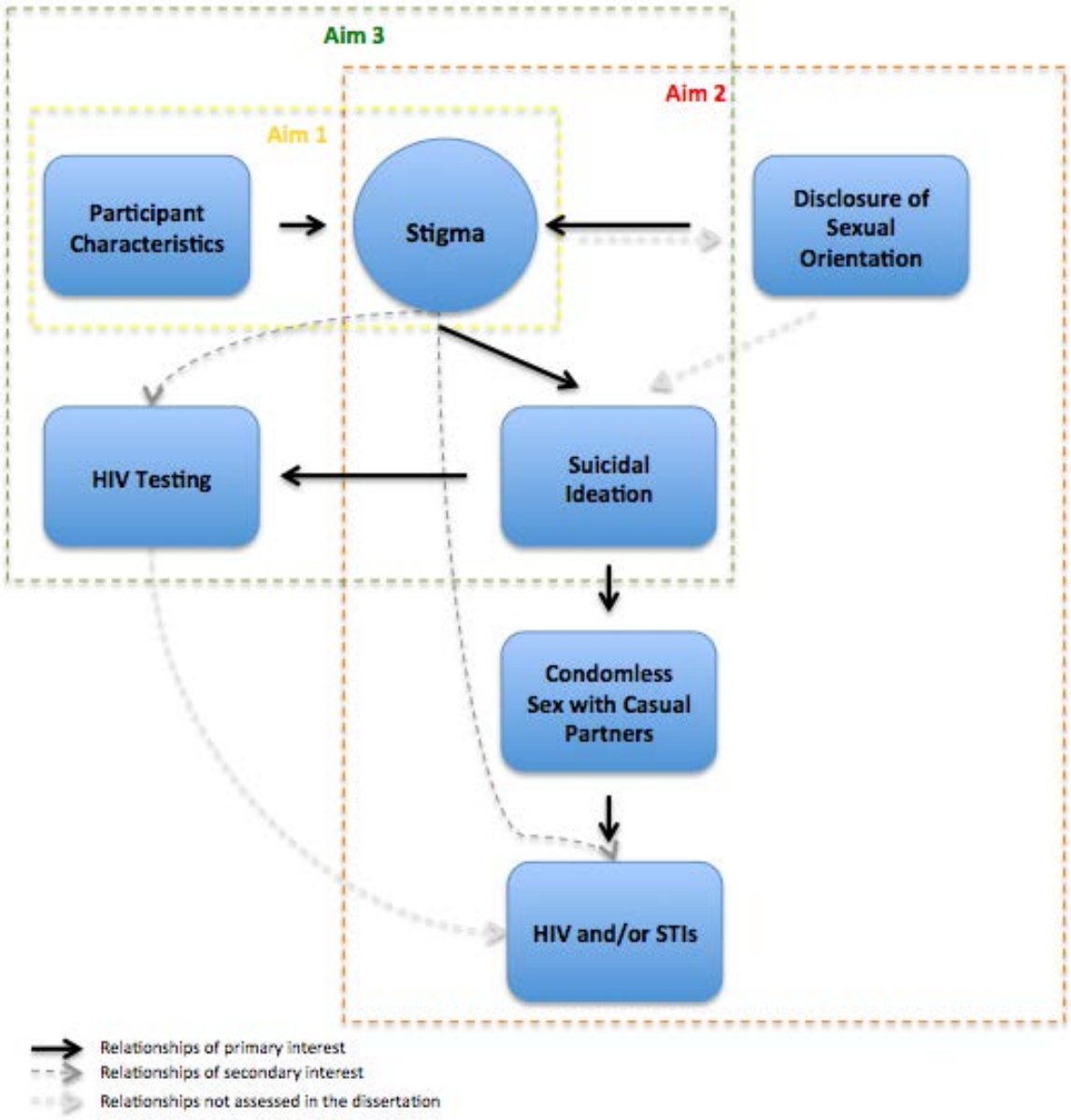
Conceptual framework

My conceptual framework is based on stigma-relevant theories and research (Figure 1). Stigma and disclosure of sexual orientation impact each other

bidirectionally. Having experienced sexual stigma may impact whether one discloses same-sex practices and disclosing same-sex practices may lead to experiences of sexual stigma.[26,30,99] Sexual stigma is associated with HIV testing directly and by way of suicidal ideation.[97] Sexual stigma is associated with HIV and STI incidence by way of suicidal ideation and condomless sex.[41,76,80]

Suicidal ideation is a central construct in this framework for several reasons. Stigma stressors work synergistically to impact mental health.[19,23] In Herek et al. the authors highlight the psychological processes many victims experience as a result of trauma, such as sexual stigma, that are relevant to this study.[3] When sexual minorities are in the early stages of "coming out," they do not have many of the resources to cope psychologically as compared to those who are in later stages of coming out. In a highly stigmatizing context such as Nigeria, it is unlikely that many MSM can live openly gay or bisexual lives. Even those who are comfortable with their sexual orientation or same-sex practices are at risk of feelings of depression and helplessness when one blames oneself for trauma, which is a common occurrence following an attack because victims try to make sense of the attack and want to perceive the world as a just place.[3] Sexual stigma may also cause stressors that are additive to general stressors and which lead to hypervigilance and the utilization of strategies to minimize sexual stigma that are a result of fear that enacted stigma may occur.[17,19] Therefore, cognitive processes associated with the sexual stigma-mental health association may lead to increased sexual risk behavior as well as inhibit HIV testing. Lower levels of HIV testing further HIV and STI incidence by reducing the number of MSM who are aware of their HIV infection and may engage in subsequent protective behavior, such as using condoms.

Figure 1. Conceptual framework



Research Question and Aims

Aim 1: Characterize patterns of sexual stigma, explore if socio-demographic and psychosocial characteristics are associated with stigma patterns, and evaluate if patterns are associated with HIV prevalence and STI prevalence and incidence, among all participants.

Hypothesis 1: Patterns of stigma will cluster together into three classes that reflect severity of stigma.

Method: Latent class analysis (LCA), latent class regression (LCR), latent class with distal outcome modeling

Aim 2: Identify indirect pathways linking sexual stigma to HIV and/or STI incidence by testing a model in which stigma and HIV and/or STI incidence are associated via suicidal ideation and condomless sex, among all participants.

Hypothesis 1: The association between sexual stigma and HIV and/or STI incidence will be partially mediated by suicidal ideation and condomless sex.

Method: Path analysis

Aim 3: Identify if suicidal ideation moderates the association between sexual stigma and HIV testing, among participants not previously diagnosed with HIV.

Hypothesis 1: Sexual stigma will be negatively associated with HIV testing and this association will be exacerbated by suicidal ideation.

Method: Latent class with distal outcome modeling and latent transition analysis (LTA)

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Chapter 2: Methods

Parent study

The TRUST/RV368 Study began in 2013 and is a prospective cohort study that utilizes respondent driven sampling (RDS) in order to recruit Nigerian MSM.[1] RDS is a common method to recruit hard-to-reach populations that generally lack sampling frames needed for probability-based sampling methods, in which peer networks are used to reach eligible participants and information about their network connections are used to generate population estimates.[2] The primary aims of this parent study are to evaluate the efficiency of RDS to recruit Nigerian MSM, to measure changes in behavior and clinical outcomes as a result of access to combination prevention and treatment at a venue friendly to MSM, and to define an optimal service delivery model for uptake of treatment for and retention of MSM in HIV care.

Study protocol

The primary study site is the TRUST Clinic located within a community-based organization serving sexual minorities in Abuja, Nigeria. In May 2015, a second study site was started in Lagos, Nigeria. Abuja lies in the middle of the country, is the capital of Nigeria and is a relatively new city, having been built in the 1980s. Lagos in the southwest is the former capital and is the largest city in Nigeria. A structured questionnaire, consisting of 11 modules, is administered during the first two study

visits and biological samples are collected, with the second visit two weeks after the first. From then on study visits are every three months for up to 18 months. Participants found to be positive for HIV are offered anti-retroviral therapy (ART) irrespective of their CD4 count. Prior to starting ART, participants complete three pre-treatment as prep educational sessions. Participants who test negative for HIV at the first study visit continue to be tested for HIV at each study visit unless they become HIV positive.

The TRUST/RV368 Study is a joint collaboration involving the Institute of Human Virology at the University of Maryland School of Medicine, the Johns Hopkins University Schools of Medicine and the Bloomberg School of Public Health, the U.S. Military HIV Research Program, the Department of Defense Walter Reed Program Nigeria, the Institute of Human Virology, Nigeria and the Population Council, Nigeria. The Principal Investigator is Dr. Man Charurat of the University of Maryland, School of Medicine. Approval for the study was obtained by the Federal Capital Territory Health Research Ethics Committee at Garki Hospital and the University of Maryland Baltimore Institutional Review Board. Johns Hopkins University researchers affiliated with the study, including myself, are covered under the University of Maryland IRB.

Sample

Eligibility criteria included individuals who: 1) were born male; 2) were at least 16 years old; 3) had a history of insertive or receptive anal sex within the last year; 4) agreed to participate in the study for 18 months; 5) agreed to STI testing including for HIV; 6) were able to provide informed consent either in English or Hausa, and; 7)

presented a valid RDS recruitment coupon. All participants provided written informed consent. Each enrolled participant receives Naira 1,000 at the end of every study visit, which is approximately six US dollars. Each enrolled participant also receives Naira 1,000 for each eligible individual they recruit who brings a valid coupon to the study site. The TRUST/RV368 Study worked with a community-based organization to identify five seeds representing different religions, languages, and HIV statuses. Each individual recruited into the study is given three recruitment coupons and trained in how to recruit other MSM into the study. As of February 2016, 1,480 individuals enrolled in TRUST/RV368 and 538 (36%%) were HIV negative, 548 (37%) were HIV positive, and 394 (27%) did not get tested for HIV and were lost to follow-up.

Study population for the present analysis

The sample will consist of all participants who completed the first study visit, which are the, 1,480 individuals who had enrolled in TRUST/RV368 as of February 2016. All study variables will be from baseline visits except for HIV and STI incidence data. Samples differed by study aim. Aim 1 and 2 included all participants from baseline. Aim 3 included all participants except those previously diagnosed with HIV as the outcome was having been tested for HIV and those who had been previously diagnosed would all have been previously tested for HIV.

Measures

Sexual stigma measures

Stigma generally operates through a variety of stigma mechanisms, which account for why it is negatively associated with a variety of life domains and is a persistent problem in society.[3–5] For example, MSM from SSA who have experienced blackmail often also face physical assault, verbal harassment, and sexual assault at the hands of their blackmailers. Therefore, it was important to choose a number of sexual stigma mechanisms that reflect a range of stigmatizing experiences among MSM in SSA and which were also generalizable to contexts outside of SSA. A review of the literature revealed nine stigma indicators that reflected types of sexual stigma experiences found to be prevalent in the US, Western Africa, and Southern Africa including seven types of enacted stigma and two types of felt stigma (Table 1). I believe this is a sufficient number to have for LCA model estimation. According to a Monte Carlo simulation of LCA, the authors recommend no fewer than five indicators and concluded that using more indicators is beneficial in general.[6]

Table 1. Nine stigma indicators included in the latent class analysis model

Enacted Sexual Stigma Indicators
1. Have you ever felt that family members have made discriminatory remarks or gossiped about you because you have sex with men?
2. Have you ever felt rejected by your friends because you have sex with men?
3. Have you ever felt that the police refused to protect you because you have sex with men?
4. Have you ever been verbally harassed and felt it was because you have sex with men?
5. Have you ever been blackmailed by someone because you have sex with men?
6. Have you ever been pushed, shoved, slapped, hit, kicked, chocked, or otherwise physically hurt by someone? Do you believe any of these experiences of physical violence was/were related to the fact that you have sex with men?*
7. Have you ever been forced to have sex when you did not want to? (By forced, I mean physically forced coerced to have sex, or penetrated with an object, when you did not want to). Do you believe any of these experiences of sexual violence were related to the fact that you have sex with men?*
Felt Sexual Stigma Indicators
8. Have you ever felt afraid to go to health care services because you have sex with men?
9. Have you ever felt scared to walk around in public places because you have sex with men?

* This was a two-part question. Only participants who responded yes to both were counted for this indicator.

The following variables are summarized in Table 2.

HIV and STI outcomes

HIV prevalence and incidence

Participants were tested for HIV infection upon enrollment using a parallel algorithm of Determine® (Alere, Watham, MA, USA) and Uni-gold® (Trinity Biotech, Co-Wicklow, Ireland) and every three months thereafter. HIV prevalence was defined as an individual with a positive HIV test at baseline. HIV incidence was defined as an individual with a positive HIV infection over the course of the study following a negative result at baseline. All individuals who had enrolled by February 2016 were

included, therefore individuals who enrolled earlier would have longer follow-up periods than individuals who enrolled later.

STI prevalence and incidence

Urine and rectal swab specimens were collected at enrollment and every three months thereafter and tested for chlamydia and gonorrhoea using the Aptima Combo 2® assay (Hologic, Bedford, MA, USA). STI prevalence was defined as an individual with a positive gonorrhoea and/or chlamydia test at baseline. STI incidence was defined as any positive chlamydia and/or gonorrhea infection over the course of the study following a negative result. Participants did not have to test negative at baseline but they did have to have a negative test result before a positive test result to be considered an incident infection, e.g. a participant who had a positive test result at baseline, then had a negative test result, and then had another positive test result would be counted as an incident infection. If an individual had more than one incident STI infection, they were only counted once. All individuals who had enrolled by February 2016 were included, therefore individuals who enrolled earlier would have longer follow-up periods than individuals who enrolled later.

HIV testing

HIV testing was measured by asking "Have you ever been tested for HIV infection?" Having ever received an HIV test during one's lifetime remains relevant in countries such as Nigeria where reported levels of HIV testing are low.[7,8]

Disclosure of same-sex practices

In aim 1 disclosure was assessed with two questions "Have you told any member of your family that you have sex with other men or that you are attracted to other men?" and "Have you told any health care worker that you have sex with other men or that you are attracted to other men?" A composite disclosure variable was created with the following categories: disclosure to neither, disclosure to a family member, disclosure to a health worker, and disclosure to both a family member and health worker. For aim 2 only a binary variable reflecting disclosure to a family member was utilized as there were not significant differences between sexual stigma classes by disclosure to a health worker.

Suicidal ideation

Suicidal ideation was chosen as the indicator of poor mental health. Suicidal ideation was measured by asking "Have you ever felt like you wanted to end your life?" Suicidal ideation is an appropriate variable for this analysis because 1) it is strongly correlated with other indicators of poor mental health, 2, it is associated with a very serious outcome of suicide that is an important health issue in LMICs, and 3, it has been found to be associated with sexual stigma across a number of settings.

Condomless sex with casual sex partners

Condomless sex with casual sex partners was assessed with the question "How often are condoms used when you have anal sex with men who are casual partners?" Answer options of never, almost never, about half the time, and almost always were categorized as condomless sex. Individuals who had not have a casual sex partner in the last 12 months and individuals who had always used condoms with casual partners were categorized as consistent condom users. Although other dimensions of sexual risk taking are valuable, I wanted to explore the risks associated with condomless anal sex with casual partners because it is associated with HIV and STIs[9,10] and it may be more amenable to intervention than some other measures of sexual risk taking.[11–15]

Table 2. Prevalence of primary non-stigma measures (n=1,480)

Variable	N	%
HIV Prevalence		
Negative/Not tested	932	63.0
Positive	548	37.0
HIV Incidence		
No	1434	96.9
Yes	46	3.1
STI Prevalence		
Negative/Not tested	1204	81.35
Positive	276	18.6
STI Incidence		
No	1318	89.1
Yes	162	11.0
HIV Testing		
No	462	31.2
Yes	1017	68.8
Composite Disclosure		
To Neither	902	61.0
To Family Member	114	7.7
To Health Worker	328	22.2
To Both	130	8.8
Suicidal Ideation		
No	1,049	71.1
Yes	427	28.9
Condomless Sex		
No	705	47.7
Yes	772	52.3

HIV testing is missing one response, disclosure to a health worker is missing 6, suicidal ideatin is missing 4, and condomless sex with casual partners is missing 3.

Covariates

Participant characteristics that have been found to be associated with sexual stigma among sexual minorities in LMICs were included as covariates, including age, education, religion, occupation, sexual orientation, gender (male, female, both male and

female), city, having had a female sex partner in the last 12 months, marriage or cohabitation ever with a female partner, and previous diagnosis with HIV.[16–18] Also included as covariates were MSM social network size, RDS recruitment wave, and HIV transmission knowledge. MSM social network size was included in order to evaluate if sexual stigma was associated with social networks and was dichotomized at the median based on responses to the question: "How many different people do you know personally who are MSM i.e. you know them and they know you, you have seen them in the last two years, and you could contact them if you needed to?" RDS recruitment wave was included in order to account for changing participant characteristics as sampling progresses to harder-to-reach subpopulations in later waves[19] and was dichotomized based on enrollment during the first or second half of sampling waves. Two questions assessing knowledge of HIV transmission risk were included to account for the possibility that health education may be associated with whether one contracts HIV and STIs: "What type of sex puts you most at risk for HIV infection?" (answer options: vaginal, anal, oral, or all carry equal risk) and "Which type of anal sex position puts you most at risk for HIV infection?" (answer options: insertive, receptive, insertive and receiptive carry equal risk).

Aim 1 data analyses

Latent class analysis

Latent class analysis (LCA) was utilized to produce an aggregate, categorical measure of sexual stigma. LCA is conceptually similar to factor analysis where an underlying latent variable is used to describe the relationship among a set of observed items, except that in LCA the underlying latent variable is categorical, its manifest indicators are generally categorical, and LCA identifies meaningful homogeneous subgroups that responded to a set of indicators in similar patterns, whereas factor analysis identifies relations between variables and assumes that these relations apply across all people.[20] A benefit of both LCA and factor analysis is that they estimate the amount of measurement error and adjust for this measurement error. There are two types of LCA model parameters. The class prevalence specifies the proportion of the sample in each class and conditional item probabilities indicate the probability that an individual in a given latent class had of endorsing the indicator.

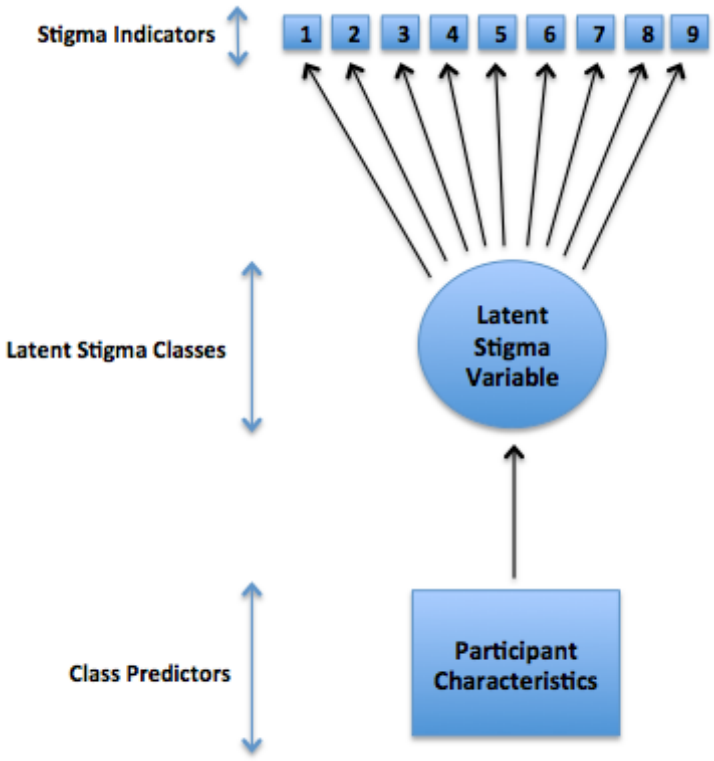
For aim 1, LCA was conducted on nine stigma indicators and models with one to six classes were examined for fit. The final number of classes was decided by comparing fit statistics, including the Bayesian information criterion (BIC), the Lo-Mendel-Rubin (LMR) likelihood ratio test and the bootstrapped likelihood ratio test (BLRT), all three of which have been found to be good indicators for class enumeration.[21] The model with the lowest BIC value and the last model for which the LMR and BLRT p-value is at or below .05 has the best goodness of fit. Conditional item probabilities and estimated class prevalences were also assessed in order to make sure that the final model had

meaningful classes and that no class was too small in size. Analysis was conducted using MPlus Version 7.4.[22]

Latent class regression

Latent class regression (LCR) was utilized to assess the association between participant characteristics and class membership in a multinomial logistic regression (Figure 2). The primary difference between LCR and traditional logistic regression is that the outcome is latent rather than directly observed.[20] The objective of LCR is to identify characteristics that are associated with membership in the various latent classes and it is conducted once a baseline model with good fit has been identified using LCA. Adjusted odds ratios were produced comparing the high vs. low stigma classes, high vs. medium stigma classes, and the medium vs. low stigma classes. The LCR and the following models were run clustering for city using a sandwich estimator to account for the potential correlation between participants of the same city.[22]

Figure 2. Aim 1: Latent class regression



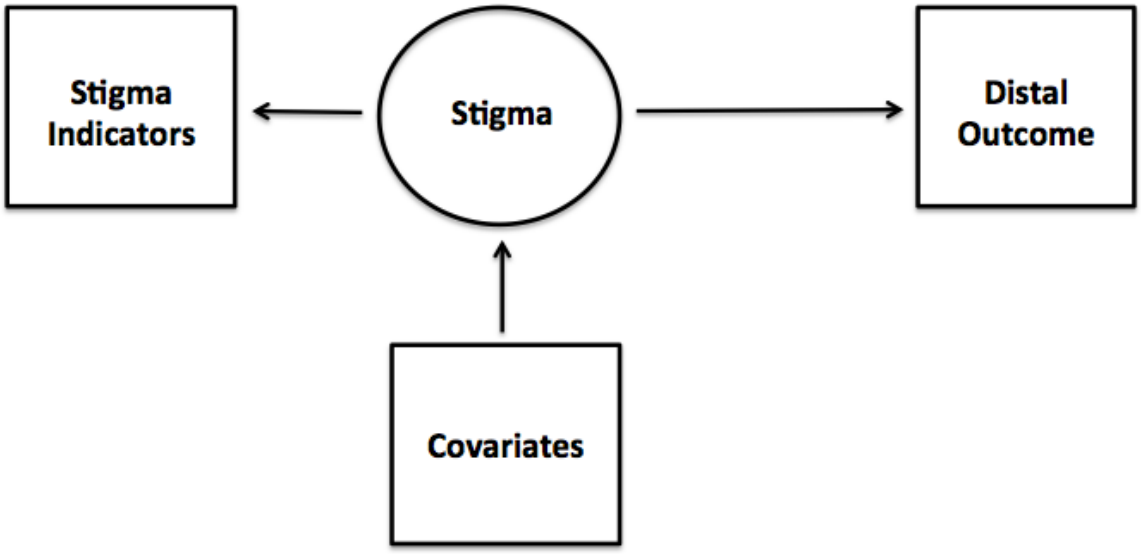
Latent class with distal outcome modeling (LCD)

LCD allows researchers to assess the association of a latent class variable with a distal outcome. I did this with the auxiliary command in MPlus, where the distal outcome is specified followed by (e). This is a one-step approach in which latent classes and their associations with auxiliary variables (covariates of class and distal outcomes) are estimated simultaneously.[23] This approach provides the proportion of each outcome by latent class and conducts chi-square goodness of fit testing to assess if differences in the outcome by class are statistically significant. There are some limitations of this approach. Since all these steps are done simultaneously the auxiliary

variables may inform the estimation of the latent classes and could distort the latent class estimation.[23,24] Additionally, this approach does not account for misclassification errors when estimating the association between the latent classes and distal outcome as an individual's most likely class is treated as a known class.

In this aim, LCD assessed the association between sexual stigma classes and HIV prevalence, STI prevalence and STI incidence separately, while adjusting class membership for all variables that were found to be significantly associated with class in the LCR at $p<.05$ and clustering by city (Figure 3). Models testing the relationship between sexual stigma and each outcome were run separately and each outcome was dichotomized as positive vs. negative or not tested.

Figure 3. Aim 1: Latent class with distal outcome model assessing the association between sexual stigma and distal outcomes, adjusting for participant characteristics and clustering by city in a sample of Nigerian men who have sex with men



Aim 2 Data Analyses

Creation of three stigma subgroups

Aim 2 utilized the same latent sexual stigma variable developed in aim 1. For this aim, predicted class probabilities (posterior probabilities) from that LCA were used to determine each participant's most likely class (modal class) and resulting analyses were conducted using modal class.[25] In effect, the latent sexual stigma variable was converted into a manifest variable with three categories of low, medium, and high stigma based on the sexual stigma class individuals were most likely to be in.

Bivariate associations between sexual stigma groups and model variables

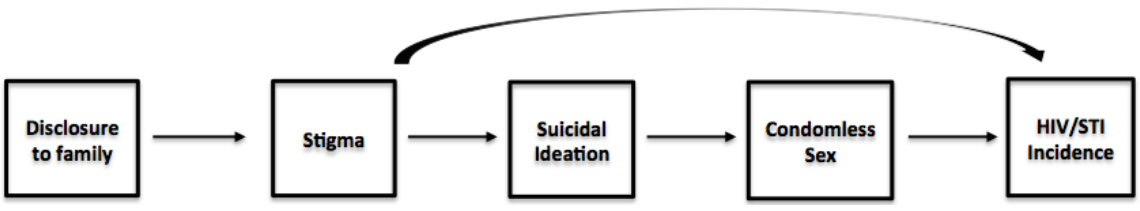
Chi-square goodness of fit testing was used to determine if the proportion of the following variables differed by sexual stigma group at $p<.05$ significance level: disclosure of same-sex practices, suicidal ideation, condomless sex, HIV incidence and STI incidence. This step determined sexual stigma's direct relationships with the constructs of interest in the model.

Mediation Model

The pathways in the model were chosen based on a priori theoretical and empirical evidence. Path analysis was used to test whether a sexual stigma-HIV/STI incidence association was partially mediated by suicidal ideation and condomless sex. Path analysis has the advantages of testing models that are conceptually derived a priori using statistical tests, accounting for measurement error, and being able to test

multiple dependent variables at the same time. Disclosure of same-sex practices was entered into the model as a covariate of stigma since aim 1 found that disclosure was strongly positively associated with the stigma classes that formed the basis of this analysis. A direct association between stigma and HIV/STI incidence was entered into the model to allow for the likelihood that the relationship between stigma and HIV/STI incidence is also explained by factors other than suicidal ideation and condomless sex. A test of whether a larger model (with the direct association between stigma and HIV/STI incidence included in addition to the indirect associations) had better fit than a smaller model (without the direct association) was conducted using a robust chi-square model difference test. The path analysis produced standardized regression estimates and standard errors (SEs) and was clustered by city using the cluster command in MPlus, which uses a sandwich procedure to calculate robust errors.[22] Model fit was assessed using the following criteria: χ^2 goodness-of-fit test p-value>.05, Root Mean Square Error of Approximation (RMSEA)<.05, Comparative Fit Index (CFI)>.90, and Tucker-Lexis Index (TLI) >.90.

Figure 4. Aim 2: Path analysis of the association between sexual stigma and HIV and/or STI incidence



Aim 3 Data Analyses

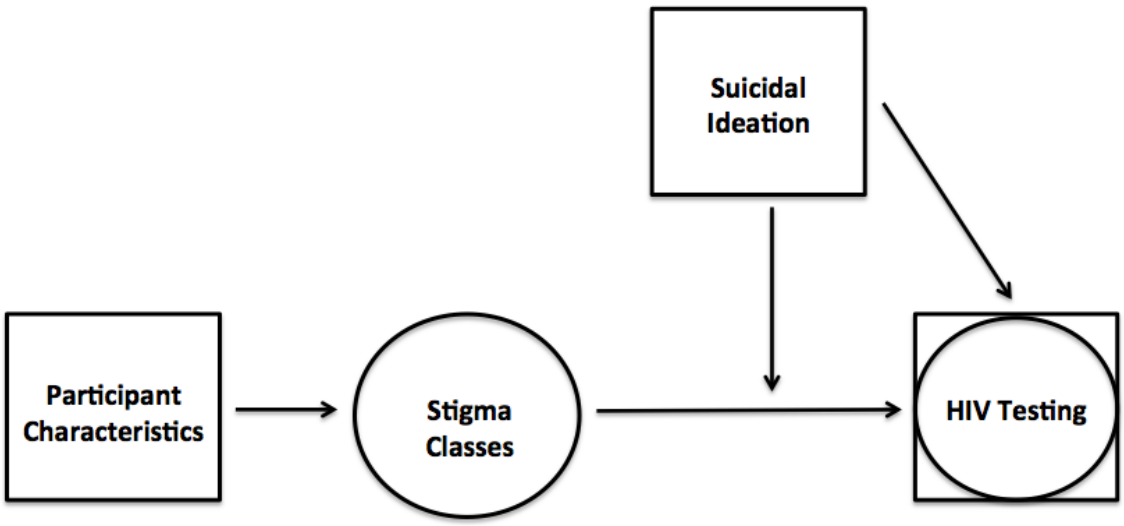
Aim 3 utilized the same latent sexual stigma variable developed in aim 1. Separate models were run to assess the relationship between sexual stigma class and suicidal ideation and stigma class and HIV testing, adjusting for age, self-reported gender, RDS recruitment wave, and knowledge of HIV transmission risk using latent class with distal outcome modeling. These four covariates were chosen in order to reflect variables found to be associated with sexual stigma class in aim 1, but paired down in order to develop a more parsimonious interaction model. Those previously aware of their HIV status at enrollment were excluded. These models assessing direct effects, and the subsequent models, were run clustering for city using a sandwich estimator to account for the potential correlation between participants of the same city.[22]

In order to test main and interaction regression effects I used a novel application of latent transition analysis (LTA). LTA is a type of structural equation model that traditionally uses longitudinal data to explore changes in the latent classes of individuals over time.[20] Although we did not use longitudinal data in this analysis, we chose to use LTA because it can allow the regression of an observed categorical variable on a latent class variable, which traditional SEM does not allow. I conducted a modeling extension of the LTA framework in two ways. LTA is usually used with longitudinal data to quantify the incidence of transitions between latent statuses from one time to another,[20] but in this case I used cross-sectional data. The use of cross-sectional data for LTA is a modeling extension whereby transition probabilities convert in their meaning to signify the probability of different class combinations (e.g. the probability that

individuals in the high stigma class have also had an HIV test).[26,27] The other difference is that rather than have the outcome variable be a latent class variable the outcome variable in this case is an observed variable, HIV testing, in which each person's category is already known rather than estimated as a latent class, as would be the case with traditional LTA. Therefore the outcome variable, HIV testing, was treated as a perfectly measured latent variable in order to produce regression estimates and odds ratios reflecting the association between stigma class and HIV testing, and which allowed for the covariate suicidal ideation to be entered into the model simultaneously with stigma classes.

A model was run first to assess main effects for the direct association between suicidal ideation and HIV testing, including in the model the direct association between stigma class and HIV testing, and adjusting stigma class by age, self-reported gender, RDS recruitment wave, and knowledge of HIV transmission risk, and excluding those previously aware of their HIV status at enrollment. Figure 5 depicts the final analytical model from which we derived interaction effects. In the final model, there is a latent stigma class variable adjusted for participant characteristics as the primary predictor variable. A perfectly measured HIV testing variable is regressed on stigma class and on suicidal ideation separately. Lastly, HIV testing is also regressed on an interaction between suicidal ideation and stigma class (the interaction effects).

Figure 5. Aim 3: Analytical model for an analysis of whether the relationship between sexual stigma and HIV testing varies by suicidal ideation, adjusting stigma classes by participant characteristics



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Chapter 3: Manuscript 1

Stigma patterns linked to HIV prevalence and sexually transmitted infection prevalence and incidence for Nigerian men who have sex with men

Abstract

Background

Sexual stigma may be an important driver of HIV and sexually transmitted infections (STIs) but little is known about stigma towards Nigerian men who have sex with men (MSM). We assessed patterns of sexual stigma across Nigerian MSM and whether stigma patterns were associated with HIV prevalence and STI prevalence and incidence.

Methods

Data collected from the TRUST/RV368 Study, a prospective cohort of Nigerian MSM enrolled from March 2013 to February 2016. Latent class analysis was used to develop stigma classes, and predictors of class and distal outcomes were included.

Results

The sample included 1,480 participants. Three stigma classes of low, medium, and high emerged with 59% in the medium or high classes. Participants who had disclosed same-sex practices, identified their gender as not male, and who were previously diagnosed with HIV were significantly more likely to be in the high stigma class compared to the low stigma class. A dose-response association was found between stigma class and HIV prevalence (28%, 39%, 57%, χ^2 p<.001), STI prevalence (15%, 22%, 24%, χ^2 p=.040), and STI incidence (8%, 11%, 19%, χ^2 p=.023).

Conclusions

Sexual stigma was pervasive among Nigerian MSM and higher stigma severity was associated with increased risk of HIV and STIs. Strategies to improve MSM engagement with the HIV prevention and care continuums may need to address sexual stigma.

Introduction

Men who have sex with men (MSM) are disproportionately affected by HIV as compared to other reproductive aged adults in every region of the world.[1] Individual-level behaviors such as inconsistent condom use have been insufficient in explaining the rising HIV epidemic among MSM[2] leading to a greater focus on factors such as sexual stigma.[3] Sexual stigma, which is commonly defined as the co-occurrence of labeling, stereotyping, separation, status loss, and discrimination within a power imbalance[4] specifically affecting MSM due to their same-sex practices,[5] is pervasive in sub-Saharan Africa (SSA). The most commonly reported manifestations or mechanisms of sexual stigma in SSA are enacted stigma, which refers to behavioral expressions of stigma such as physical violence, rape, and blackmail, and perceived stigma, which refers to real or imagined fear of stigma such as fear of seeking health care.[6–13] Both types of stigmas are interlinked and are important to assess because they often affect behavior and health outcomes.

Most studies have assessed sexual stigma using variable-centered approaches, utilizing individual indicators or summary score measures. For example, homophobic abuse, as a single indicator of sexual stigma, was positively associated with HIV infection among Ugandan MSM.[14] However, homophobic abuse combined and assumed as equal variable experiences like verbal, moral, physical or sexual abuse. Another approach has been to aggregate multiple mechanisms of sexual stigma into a summary score with a cut point. A study assessing sexual stigma-related violence towards Tanzanian MSM summed together any experiences of physical, verbal, moral or sexual abuse, which was then dichotomized at the median into low violence vs. high violence.[15]

A limitation of this approach is that there are often no clear guidelines regarding where to place cut-offs which can impose differences in sexual stigma groups that may not be meaningful and could result in classification errors.[16] Another variable-centered approach is to use factor analysis to develop sexual stigma factors,[17] but in factor analysis the emphasis is on identifying relations between variables, assuming that these relations apply across all individuals.[18]

Because sexual stigma is a social process and may manifest itself through a variety of mutually reinforcing mechanisms, adopting a person-centered latent modeling approach such as latent class analysis (LCA) will better account for various negative experiences related to same-sex practices that individually differ between MSM.[4,19] The advantage of LCA is that it identifies patterns of responses across individuals in order to find meaningful homogeneous groups that would be difficult to discern by assessing indicators separately.[18] Such an approach is better able to model stigma as a fundamental cause of health[20] and identify sub-groups of MSM for whom health interventions can be designed and targeted.

One country in SSA where sexual stigma may contribute to HIV disparities among MSM is Nigeria.[21–23] Although it has only recently begun to be described,[12,24,25] expanding criminalization of same-sex behavior in Nigeria has been associated with increased fear and avoidance of healthcare[24] and internalized homophobia has been associated with HIV infection among MSM.[25] In this study, we applied the LCA approach to identify patterns of sexual stigma among Nigerian MSM, assessed which participant characteristics were associated with stigma patterns, and evaluated whether stigma

patterns were associated with HIV and sexually transmitted infections (STIs) prevalence and STI incidence.

Methods

Study Design and Data Collection Procedures

The TRUST/RV368 study is a prospective multi-site cohort that utilizes respondent-driven sampling (RDS) to recruit MSM into a comprehensive model of HIV prevention, treatment, and care services in Abuja and Lagos, Nigeria, as previously described.[23,26] Eligibility criteria included individuals who: 1) were born male; 2) were at least 16 years old; 3) had a history of insertive or receptive anal sex within the last year; 4) agreed to participate in the study for 18 months; 5) agreed to STI testing including for HIV; 6) were able to provide informed consent either in English or Hausa, and; 7) presented a valid RDS recruitment coupon. All participants provided written informed consent. Approval for the study was obtained by the Federal Capital Territory Health Research Ethics Committee, the University of Maryland Baltimore Institutional Review Board (IRB), and the Walter Reed Army Institute of Research IRB.

All eligible participants completed the full baseline behavioral questionnaire and were provided with HIV testing and counselling upon enrollment using a parallel algorithm of Determine® (Alere, Watham, MA, USA) and Uni-gold® (Trinity Biotech, Co-Wicklow, Ireland). Urine and rectal swab specimens were collected at enrolment and every three months thereafter and tested for *Chlamydia tachomatis* (CT) and *Neisseria gonorrhoea* (GC) using the Aptima Combo 2® assay (Hologic, Bedford, MA,

USA). This allowed for the assessment of both prevalent and incident STI infection with incidence defined as any positive CT and/or GC infection following a negative result over the course of the study. Prevalent infection was defined as a positive test result at baseline. All individuals who had enrolled by February 2016 were included, therefore individuals who enrolled earlier would have longer follow-up periods than individuals who enrolled later, but data only includes the first incident STI infection for an individual.

Measures

A review of the literature revealed nine stigma indicators, seven enacted stigma and two perceived stigma, that reflected types of sexual stigma experiences found to be prevalent in the US, Western Africa, and Southern Africa (Table 1).[27] Participants' characteristics that have been found to be associated with sexual stigma among sexual minorities were included as covariates, including age, education, religion, occupation, sexual orientation, gender (male, female, other), city, disclosure, having had a female sex partner in the last 12 months, marriage or cohabitation ever with a female partner, and previous diagnosis with HIV.[12,19,25] Disclosure was assessed with two questions: "Have you told any member of your family that you have sex with other men or that you are attracted to other men?" and "Have you told any health care worker that you have sex with other men or that you are attracted to other men?" MSM social network size was included in order to see if sexual stigma was associated with social networks and was dichotomized at the median based on response to the question: "How many different people do you know personally who are MSM i.e. you know them and they

know you, you have seen them in the last two years, and you could contact them if you needed to?" RDS recruitment wave was included to account for changing participant characteristics as sampling progresses to harder-to-reach subpopulations in later waves[26] and was dichotomized based on enrollment during the first or second half of sampling waves. Two questions assessing knowledge of HIV transmission risk were included to account for the possibility that health education may be associated with whether one contracts HIV and STIs: "What type of sex puts you most at risk for HIV infection?" (answer options: vaginal, anal, oral, or all carry equal risk) and "Which type of anal sex position puts you most at risk for HIV infection?" (answer options: insertive, receptive, or insertive and receptive carry equal risk).

Analyses

Latent class analysis

Latent class analysis (LCA) was conducted on nine stigma indicators and models with one to six classes were examined for fit. The final number of classes was decided by comparing fit statistics, including the Bayesian information criterion (BIC), the Lo-Mendel-Rubin (LMR) likelihood ratio test and the bootstrapped likelihood ratio test (BLRT); all three tests have been found to be good indicators for class enumeration.[28] The model with the lowest BIC value and the last model for which the LMR and BLRT p-value is at or below .05 has the best goodness of fit. The BIC and LMR favored the three-class model and the BLRT favored a four-class model. After a review of the conditional item probabilities, which suggested a meaningful grouping of classes with an adequate

number of participants per class, a three-class model was selected to fit the data best (Table 2). Classification accuracy was moderate, with an entropy value of .67. Analysis was conducted using MPlus Version 7.4.[29]

Latent class regression

Latent class regression (LCR) was utilized to assess the association between participants' characteristics and class membership in a multinomial logistic regression. The LCR and latent class with distal outcomes model were performed clustering for city using a sandwich estimator to account for the potential correlation between participants within the same city.[16]

Latent class with distal outcome modeling

The associations between stigma classes and HIV prevalence, STI prevalence, and STI incidence were assessed using latent class with distal outcome modeling, while adjusting for class membership and all variables that were found to be significantly associated with class in the LCR at $p<.05$. A model testing the association between sexual stigma and each outcome dichotomized as positive vs. negative or not tested was performed. Initial analysis was conducted separately for CT and GC and was subsequently combined. The analyses were conducted in MPlus using the auxiliary command followed by listing the distal outcomes and "(e)," which is a one-step approach in which latent classes, latent class regression on covariates, and regression of the distal outcome on classes are estimated simultaneously.[29]

Results

Sample characteristics

From March 2013 to February 2016, a total of 1,480 participants (n=961 from Abuja and n=519 from Lagos) who completed the baseline questionnaire were included. The sample predominately consisted of MSM who were younger (<25 years old, 59.9%), Christian (69.9%), employed (55.5%), bisexual (62.9%), and male-identified (82.1%) (Table 3). The majority had not disclosed their same-sex practices to a family member or a health worker. HIV transmission knowledge was low, with only 22.8% knowing that anal sex was the type of sex most likely to transmit HIV and less than half knowing that receptive anal sex was riskier than insertive anal sex. The prevalence of different types of sexual stigma varied from 16.0% having ever felt that the police refused to protect them to 32.2% having ever experienced verbal harassment because they have sex with men (Figure 1).

Overall, 548 (37.0%, CI 34.6%-39.5%) tested positive for HIV, 276 (18.6%, CI 16.7%-20.7%) tested positive for STIs, and 162 (11.0%, CI 9.5%-12.6%) had an incident STI infection.

Latent stigma classes

The three stigma classes that emerged from the LCA represented low (n=605, 41%), medium (n=680, 46%), and high stigma subgroups (n=195, 13%) (Figure 1). Although the results of the LCA suggested that stigma followed a spectrum of severity,

there were several qualitative differences between the latent classes. The only indicator that was relatively high across all stigma classes was fear of seeking health care. The most common indicator in the medium and high stigma classes was verbal harassment, with nearly universal reporting of verbal harassment in the high stigma class. Prevalence of stigma indicators were similar for the medium and high classes, except that more aggressive or overt types of stigma, such as physical violence and blackmail, were more pronounced in the high stigma class.

Covariates of class membership

Table 3 presents the prevalence of each covariate among the entire sample and adjusted associations between covariates and class membership, clustering for city. Compared to individuals in the low stigma class, individuals in the high stigma class had more education (aOR=2.03, p=.001), identified their gender as female (aOR=3.23, p<.001), disclosed their same-sex practices to a family member (aOR=15.22, p<.001) or both a family member and health worker (aOR=27.97, p<.001), had a larger social network size (aOR=3.54, p=.077), and had been diagnosed with HIV prior to enrollment (aOR=1.60, p=.002). Similar to those in the high stigma class, participants in the medium stigma class were less likely to have had a female sex partner (aOR=.65, p<.001) and more likely to have disclosed their same-sex practices to a family member (aOR=5.95, p=.002) and to both family and a health worker (aOR=9.96, p<.001), as compared to the low stigma class. Those in the high stigma class were less likely to be recruited in later waves (aOR=.81, p=.016) while those in the medium stigma class were

more likely to be recruited in later waves (aOR=1.08, p<.001), as compared to the low stigma class.

As sexual stigma class increased in severity, there was a significant gradient increase in HIV prevalence (28%, 39%, 57%, χ^2 p<.001), STI prevalence (15%, 22%, 24%, χ^2 p=.040), and STI incidence (8%, 11%, 19%, χ^2 p=.023) (Table 4).

Discussion

Through the use of a latent class analysis approach, we found that sexual stigma was pervasive and differentially distributed across stigma classes. Stigma was a co-occurring, multifaceted construct, with experiences occurring across a variety of contexts and perpetrated by different types of people, including family, friends, and the police. More importantly, there was a distinct dose-response relationship between stigma classes and HIV and STI outcomes, underscoring a potentially causal role that stigma may play in the acquisition of HIV and STIs. This finding supports the assertion that sexual stigma is an important fundamental determinant of health as it affects a range of outcomes through a package of mutually reinforcing stigma mechanisms.[4,20] The observed distinct characteristics of each stigma class provide an opportunity to develop and test whether stigma mitigation interventions that can be tailored to MSM subgroups at higher risk of experiencing sexual stigma can be effective at preventing HIV and STIs among Nigerian MSM.

Sexual stigma remains a persistent problem in societies partly because as one enacted stigma strategy is blocked other strategies are often strengthened or new ones are created to achieve harmful ends.[20] This emphasizes the need for sexual stigma

intervention approaches that are multilevel, such as programs that would address sexual stigma within families, among neighbors and by government actors. Although there is a dearth of evidenced-based sexual stigma mitigation strategies, such a multilevel approach echoes what has been found to be effective for interventions addressing HIV-related stigma and interventions empowering other marginalized populations.[30,3130,32,33] Additionally, sexual stigma should be explicitly addressed in national HIV planning efforts along with efforts to reduce HIV-related stigma.

Fear of seeking healthcare was the one stigma indicator that was prevalent across all three stigma classes in this study. Addressing this issue through the delivery of sensitization training to health providers for example[34] may have the potential to reach the broadest range of MSM in Nigeria and can have a profound impact in engaging MSM into HIV and STI prevention and care. In settings of high levels of sexual stigma, such as Nigeria, more progress is still needed to fast track the provision of "one-stop shop" clinics with culturally competent services. The site in which this study is embedded is a collaboration between a community based organization that provides peer education to sexual minorities and a clinical study that provides condoms and HIV testing, counseling, and treatment via providers that have received sensitization training. This collaboration, along with other combination prevention programs or "one-stop shop" models, has proven successful at improving HIV testing and engagement with care among MSM.[23,35,36] Interventions to address sexual stigma within a comprehensive model of services provided by MSM-friendly venues have the potential to reduce fear of seeking health care among MSM by improving access to providers that deliver health services in a non-stigmatizing manner.

Beyond developing comprehensive interventions for all MSM, interventions tailored to MSM subgroups more severely impacted by sexual stigma should be explored. For example, for the high stigma class characterized by more aggressive or violent forms of stigma, stigma mitigation interventions should prioritize the intersection of violence, gender, and HIV that may be shaping the context for why these individuals are experiencing such elevated levels of sexual stigma. One way to address this is by integrating a trauma-informed approach within one-stop shop venues serving MSM. Research on trauma has revealed that people living with HIV/AIDS (PLWH) have experienced multiple and intersecting forms of trauma in their life, including trauma as a result of same-sex practices, and there are calls to integrate such an approach as a standard of care for PLWH worldwide.[37] One important part of integrating a trauma-informed approach is to screen for trauma. For example, the implementation of a violence screening tool in Mexico and Thailand identified very high level of violence among MSM and transgender individuals and improved communication and trust between providers and clients.[38] The provision of psychosocial support within one-stop shop sites serving MSM is also important. Support groups and social events for MSM are associated with high knowledge of HIV risk factors and reduced feelings of isolation and lower self-esteem.[39,40] The addition of screening tools and psychosocial support to address trauma may reduce fear of seeking health care and improve access to HIV prevention and care services among a population with high levels of HIV and STIs.[22,23,41]

The finding that high sexual stigma was associated with identifying as female is consistent with previous studies and it supports the assertion that sexual stigma is often a form of gender-based violence.[19,38,42,43] Few studies have assessed the health of

individuals that do not identify as male in SSA, but given that a non-male gender is associated with very high levels of HIV[44] and with sexual stigma globally, strategies addressing varying gender identities should be coupled with stigma mitigation interventions targeting Nigerian MSM. For example, the study in Mexico and Thailand not only implemented a violence screening tool but it also provided sensitization training to providers on gender, integrated questions on sex and gender into existing clinical forms, and worked with women's shelters to admit MSM and transgender violence victims.[38] Others have suggested that programming to address sexual stigma and HIV among non-male individuals should address low self-esteem, promote human rights, move away from disease models, and address social exclusion such as by facilitating consultations between non-male identified individuals, their families and relevant stakeholders in order to reduce stigma.[45,46] Strategies addressing the intersection of gender and violence as part of tailored stigma mitigation interventions for Nigerian MSM have the potential to improve the one-stop shop model so that it explicitly addresses sexual stigma and moves beyond a disease-centered focus.

The finding that individuals in the medium stigma class were also experiencing relatively high levels of stigma and HIV and STIs indicates that these individuals may also benefit from the provision of sexual stigma mitigation interventions targeting those in the high stigma class. In comparison to those in the high stigma class, they were significantly less likely to identify as gay or homosexual, to identify as non-male, to disclose, to have larger MSM social networks, and they entered the study in later waves. These differences indicate that these may be harder-to-reach individuals with less ties to the sexual minority community in Nigeria. Stigma mitigation interventions may need

to be tailored in order to successfully reach individuals in the medium stigma class and to adequately address sexual stigma within this subgroup. Such interventions have the potential to impact a larger segment of the population since the medium stigma class was over three times the size of the high stigma class.

There are a number of limitations in this study. Although the sample size was large for a study of MSM, it may be that had there been more participants and more stigma indicators included, the LCA would have identified more classes with greater nuance. Even though we selected nine stigma indicators shown to be highly prevalent among MSM from different countries, it is also possible that important stigma indicators may have been omitted. The RDS sampling method was based on initial participants drawn from a well-networked community-based organization. This may have biased the sample in favor of more HIV positive participants who had experienced both HIV-related stigma and sexual stigma. We attempted to account for the characteristics of earlier participants in the study by adjusting for social network size and recruitment wave, but did not adjust for the sampling method directly. We were not able to include HIV incidence due to having an insufficient sample size but future studies of this cohort will assess HIV incidence as the sample size grows. This study was limited in what it could say about participants who may identify as transgender. Future research is needed to assess gender variance in Nigeria and to better understand if the category of "transgender" accurately reflects local practices. Future research on this topic should also employ latent class with distal outcome modeling that utilizes a three-step method which can account for misclassification errors when estimating the

auxiliary variables and prevent auxiliary variables from influencing class estimation, such as the manual three-step method with BCH weights.[47]

This study aligns with the body of evidence that has found that sexual stigma is linked to important disease outcomes and strengthens it in several ways. A sound stigma measure was developed using latent class analysis, which is a method that has been underutilized when assessing sexual stigma affecting MSM in SSA. It revealed three stigma classes that increased in severity and which consisted of substantial heterogeneity in terms of the type of sexual stigma, the setting, and the type of perpetrator. These patterns of sexual stigma facilitated our understanding of who was most severely impacted and pointed us to interventions that are multilevel. We also found that stigma classes were quite distinct in terms of participant characteristics and levels of stigma experienced, suggesting ways that sexual stigma mitigation approaches for Nigerian MSM may need to be tailored. Lastly, we found a dose-response relationship between stigma and HIV and STIs, signifying that sexual stigma may be an important driver of onward transmission. Achieving the UNAIDS goals of 90-90-90 by 2020 may not be possible if stigma mitigation approaches are not integrated into combination HIV programs for Nigerian MSM. Approaches that are trauma-informed may be a promising method to mitigate sexual stigma and could address the intersectional nature of the issues of violence, gender, and HIV. HIV researchers and other stakeholders in Nigeria should work in partnership with local CBOs operated by MSM and transgender individuals to develop interventions to address the behavioral and mental health impacts of sexual stigma and to improve laws and social attitudes that are negative towards same-sex practices.

Table 3. Nine stigma indicators included in the latent class analysis model

Enacted Sexual Stigma Indicators
1. Have you ever felt that family members have made discriminatory remarks or gossiped about you because you have sex with men?
2. Have you ever felt rejected by your friends because you have sex with men?
3. Have you ever felt that the police refused to protect you because you have sex with men?
4. Have you ever been verbally harassed and felt it was because you have sex with men?
5. Have you ever been blackmailed by someone because you have sex with men?
6. Have you ever been pushed, shoved, slapped, hit, kicked, chocked, or otherwise physically hurt by someone? Do you believe any of these experiences of physical violence was/were related to the fact that you have sex with men?*
7. Have you ever been forced to have sex when you did not want to? (By forced, I mean physically forced coerced to have sex, or penetrated with an object, when you did not want to). Do you believe any of these experiences of sexual violence were related to the fact that you have sex with men?*
Felt Sexual Stigma Indicators
8. Have you ever felt afraid to go to health care services because you have sex with men?
9. Have you ever felt scared to walk around in public places because you have sex with men?

* This was a two-part question. Only participants who responded yes to both were counted for this indicator.

Table 4. Goodness of fit statistics for stigma models with one to six classes in a sample of Nigerian men who have sex with men

Classes	Parameters	Log Likelihood	BIC	LMR (p-value)	BLRT (p-value)	Smallest Class	Entropy
1	9	-6898.665	13863.028				
2	19	-6276.583	12691.862	1227.351 (0.000)	1244.164 (0.000)	496 (33%)	0.74
3	29	-6210.336	**12632.367**	**130.703 (0.000)**	132.493 (0.000)	195 (13%)	0.67
4	39	-6187.941	12660.573	44.186 (0.110)	**44.791 (0.000)**	133 (9%)	0.69
5	49	-6172.18	12702.05	31.134 (0.164)	31.521 (0.013)	42 (3%)	0.71
6	59	-6160.524	12751.737	22.996 (0.383)	23.311 (0.333)	61 (4%)	0.68

Bolded font indicates which number of classes the statistic indicated has the best fit.

BIC= Bayesian Information Criterion

BLRT= bootstrap likelihood ratio test

Table 5. Individual stigma indicators and results of the latent class analysis for the three-class model in a sample of Nigerian men who have sex with men

	Full Sample (n=1480)		Three-Class Stigma Model		
			Low (40.9%, 605)	Medium (45.9%, 680)	High (13.2%, 195)
Stigma Indicator[a]	**N**	**%**	**Conditional item probabilities:**		
Family Made Discriminatory Remarks	298	20.1	**0.01**	**0.26**	**0.58**
Friend Rejection	288	19.5	**0.03**	**0.22**	**0.62**
Fear of Seeking Health Care	454	30.7	**0.14**	**0.37**	**0.63**
Police Refused to Protect Them	236	16.0	**0.05**	**0.16**	**0.49**
Scared to Walk in Public	278	18.8	**0.05**	**0.20**	**0.60**
Verbally Harassed	476	32.2	**0.00**	**0.42**	**0.96**
Blackmailed	349	23.6	**0.01**	**0.31**	**0.78**
Physical Violence	298	20.3	**0.02**	**0.21**	**0.77**
Rape	250	17.0	**0.08**	**0.21**	**0.32**

[a]All questions are asked of participants as have they ever experienced each indicator and was it because they have sex with men. Family made discriminatory remarks is missing 1, police refused to protect them is missing 3, physical violence is missing 9, and rape is missing 8 responses.

Table 6. Sample characteristics and adjusted odds ratios comparing different stigma classes, clustering by city, in a sample of Nigerian men who have sex with men

	Full Sample (n=1480)		High vs. Low[b]		High vs. Medium[b]		Medium vs. Low[b]	
Covariates[a]	**N**	**%**	**AOR**	**p-value**	**AOR**	**p-value**	**AOR**	**p-value**
Socio-demographic								
Age								
<25	887	59.9	ref.		ref.		ref.	
≥25	593	40.1	**0.93**	0.000	**0.82**	0.000	**1.13**	0.000
Education								
≤ High School	1,035	70.3	ref.		ref.		ref.	
> High School	438	29.7	**2.03**	0.001	1.70	0.121	1.20	0.178
Religion								
Muslim	444	30.1	ref.		ref.		ref.	
Christian	1,029	69.9	1.30	0.361	0.99	0.981	**1.31**	0.001
Occupation								
Student	345	23.4	ref.		ref.		ref.	
Unemployed	312	21.1	1.21	0.665	**1.35**	0.049	0.90	0.699
Employed	820	55.5	1.22	0.646	**1.64**	0.000	0.75	0.341
Sexual Orientation								
Bisexual	928	62.9	ref.		ref.		ref.	
Gay or Homosexual	547	37.1	1.44	0.068	**1.31**	0.016	1.10	0.273
Gender Identity								
Male	1,212	82.1	ref.		ref.		ref.	
Female	180	12.2	**3.23**	0.000	**2.34**	0.001	1.38	0.154
Both/Versatile	84	5.7	3.07	0.239	**1.34**	0.001	2.29	0.426
Female Sex Partner in Last 12 Months								
No	718	48.5	ref.		ref.		ref.	
Yes	762	51.5	**0.60**	0.000	0.93	0.759	**0.65**	0.000
Ever Married/Cohabitated with a Woman								
No	159	10.8	ref.		ref.		ref.	
Yes	1,319	89.2	0.96	0.551	1.57	0.228	0.61	0.118

Psychosocial								
Previously Diagnosed with HIV								
No	1,096	74.1	ref.		ref.		ref.	
Yes	344	23.2	**1.60**	0.002	1.63	0.370	0.98	0.963
Ever Disclosed Homosexuality								
Neither	902	61.0	ref.		ref.		ref.	
To Family Member	114	7.7	**15.22**	0.000	**2.56**	0.000	**5.95**	0.002
To Health Worker	328	22.2	1.85	0.508	1.08	0.880	1.73	0.232
To Both	130	8.8	**27.97**	0.000	**2.81**	0.000	**9.96**	0.000
MSM Social Network Size								
Smaller	735	49.7	ref.		ref.		ref.	
Larger	727	49.1	3.54	0.077	**3.27**	0.006	1.08	0.784
Sample Recruitment Waves								
First Half (0-11)	830	56.1	ref.		ref.		ref.	
Second Half (12-27)	646	43.7	**0.81**	0.016	**0.75**	0.001	**1.08**	0.000
Knowledge of HIV Transmission Risk								
Knows Anal Sex is Type of Sex Most Likely to Transmit HIV								
No	1078	72.8	ref.		ref.		ref.	
Yes	337	22.8	1.38	0.156	1.06	0.911	1.30	0.393
Knows Receptive Anal Sex is Position Most Likely to Transmit HIV								
No	806	54.5	ref.		ref.		ref.	
Yes	600	40.5	**1.15**	0.000	1.05	0.513	1.09	0.410

Bolded font are significant at p<.05

[a] Education is missing 7 responses, religion is missing 7, occupation is missing 3, sexual orientation is missing 5, gender is missing 4, and previous HIV diagnosis is missing 40 responses.

[b] n=1463 because 17 participants were missing data and were therefore excluded.

Table 7. Distal outcomes across three latent classes of stigma, adjusting for participant characteristics and clustering by city in a sample of Nigerian men who have sex with men

Distal Outcomes[a]	%	SE		X^2	X^2 p-value
HIV Prevalence					
			Overall test	**42.02**	0.000
High Stigma Class	0.57	0.04	Low Stigma vs. Medium Stigma	**12.89**	0.000
Medium Stigma Class	0.40	0.02	Low Stigma vs. High Stigma	**40.55**	0.000
Low Stigma Class	0.28	0.02	Medium Stigma vs. High Stigma	**12.30**	0.000
STI Prevalence					
			Overall test	**7.44**	0.024
High Stigma Class	0.24	0.04	Low Stigma vs. Medium Stigma	**7.66**	0.006
Medium Stigma Class	0.22	0.02	Low Stigma vs. High Stigma	**5.77**	0.016
Low Stigma Class	0.15	0.02	Medium Stigma vs. High Stigma	0.23	0.632
STI Incidence					
			Overall test	**9.90**	0.007
High Stigma Class	0.18	0.03	Low Stigma vs. Medium Stigma	1.89	0.170
Medium Stigma Class	0.11	0.01	Low Stigma vs. High Stigma	**9.11**	0.003
Low Stigma Class	0.08	0.01	Medium Stigma vs. High Stigma	**4.15**	0.042

Bolded font are significant at p<.05

[a]Each outcome is analyzed separately and includes adjustment for age, education, religion, employment, sexual orientation, gender, having a female partner, whether previously diagnosed with HIV, disclosure of homosexuality, MSM network size, recruitment wave, and knowledge of whether receptive anal sex is the position most likely to transmit HIV. N=1,336 because 144 participants that had a missing value for any of the variables in the analysis were excluded.

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Chapter 4: Manuscript 2

Pathways linking sexual stigma to incidence of HIV and sexually transmitted infections among Nigerian men who have sex with men

Abstract

Background

Sexual stigma affecting men who have sex with men (MSM) in Nigeria may contribute to onward transmission of HIV and other sexually transmitted infections (STIs) in Nigeria, but pathways through which this occurs are not well understood. This study assessed if suicidal ideation and sexual risk behavior contributed to the pathways between stigma and risk for HIV and STIs.

Methods

The sample consisted of 1,480 MSM who enrolled in a prospective cohort study in Nigeria that provided HIV/STI diagnosis and treatment from March 2013 to February 2016, called the TRUST/RV368 study. Using results from a latent class analysis of nine stigma indicators, participants were classified into three stigma subgroups. Path analysis was used to test a theory-driven model where disclosure led to stigma, stigma led to suicidal ideation, suicidal ideation led to condomless sex, and condomless sex lead to HIV and/or STI incidence. Both direct and indirect (mediational) paths were tested for significance at $p<.05$ and the analysis was clustered by city. The model was assessed for goodness of fit using appropriate criteria.

Results

As stigma increased in severity, incident STIs increased in a dose response relationship (STIs: 8.1%, 12.2%, 16.3% p-value=.003). Incident HIV infection was less common and increased non-significantly with increasing severity of stigma (HIV: 2.8%, 3.2%, 3.8% p-value=.798). All direct relationships in the model were significant and suicidal ideation and condomless sex partially mediated the association between stigma and HIV and/or

STI incidence. The model had good fit across all fit statistics (χ^2 p-value=.077, RMSEA=.021, CFI=.979, and TLI=.965).

Conclusions

This study provided one pathway by which sexual stigma is linked to onward HIV and STI transmission, providing evidence for multiple points of intervention that could be integrated into combination HIV programming, such as providing psychosocial support to MSM.

Introduction

Although evidence exists that HIV prevalence is disproportionately high among Nigerian men who have sex with men (MSM), a recent review of HIV incidence among MSM globally found no studies of incidence among Nigerian MSM.[1,2] There is also a paucity of data assessing STI prevalence among Nigerian MSM and no studies of STI incidence, but STIs are important to assess as they are associated with harmful sequelae and increase one's risk of contracting HIV.[3–5] It is important to assess HIV and STI incidence among Nigerian MSM and to understand drivers of HIV and STI risk that can be intervened on. One important driver at the structural level may be sexual stigma. Theoretical and empirical work has explicated some of the psychological processes affected by sexual stigma that may maintain or exacerbate poor mental health, including suicidality, and subsequently affect sexual behavior that puts MSM at risk of HIV and STIs.[6–8] Suicidal ideation is often associated with cognitive processes including hopelessness, pessimism, and negative self-schemas that may make it difficult for MSM to engage in protective health behavior, such as using condoms.

Sexual stigma-HIV/STI Relationship

Sexual stigma is the co-occurrence of labeling, stereotyping, separation, status loss, and discrimination within a power imbalance specific to stigma affecting sexual minorities due to their same-sex sexual practices.[9] It manifests at the structural level in the form of heterosexism and at the individual level as enacted, felt, and internalized stigma.[10] Enacted stigma refers to overt or objective behavioral expressions of stigma

whereas felt stigma refers to expectations of stigma in different situations and the vigilance this expectation requires. Studies have found sexual stigma to be associated with heightened fear and avoidance of seeking health care and with HIV prevalence among MSM in Nigeria and other countries in SSA.[11–14] One study of violence towards MSM across five Central American countries found that violence was positively associated with reported STI diagnosis or symptoms, although the violence could have been due to reasons other than sexual stigma[15] Pathways through which sexual stigma, a structural factor, may impact HIV and STI acquisition, individual outcomes, are not well understood. It may be that psycho-social processes mediate these relationships.

Sexual stigma-Mental Health Relationship

Meta-analyses have found that MSM have significantly higher levels of suicidal ideation and attempt than do heterosexuals.[16–19] Although the majority of mental health studies among MSM come from high-income countries, there is also growing evidence that suicidal ideation is a significant problem for MSM in SSA.[20–22] Suicidal ideation is strongly predictive of suicide attempt and it is associated with hopelessness, depression, lower self-esteem, and poor problem-solving skills.[23,24] A number of studies have shown a direct relationship between sexual stigma and suicidal ideation.[8,25–27] In a national sample from the US, sexual minorities living in communities with high levels of anti-gay prejudice had a higher hazard of mortality than those not living in such communities, which translated into a shorter life expectancy by 12 years.[26] Specific causes of death for these sexual minorities revealed that suicide was substantially elevated. A study of MSM in China found that 68% reported previous suicidal ideation

and attempts and that self-objection to homosexuality, illegal status of gay marriage in China, and disclosure of homosexuality were significantly associated with suicidal behaviors.[27]

Sexual stigma-Sexual Risk Behavior Relationship

It is likely that one intermediary factor in the sexual stigma-HIV/STI relationship is condomless sex as it is the single most important factor for HIV/STI transmission.[28] Anal intercourse has a transmission efficiency for HIV roughly 18-fold higher than that for vaginal intercourse.[29] Levels of condomless sex among MSM has been found to be as high as 31%-62% in Lagos and Abuja, Nigeria.[3,30,31] Although condoms are very effective at reducing the risk from anal intercourse, a sole focus on this individual behavior does not account for rising levels of HIV among MSM suggesting the importance of accounting for structural factors such as sexual stigma.[32,33] Sexual stigma has been found to be associated with condomless sex among MSM across a variety of settings, including China,[34] Uganda,[35] Vietnam,[36] Swaziland,[21] and in the US.[8,37,38] According to Diaz et al., sexual risk behavior is typically attributed to individual factors such as low levels of health education or low risk perception when their qualitative data with MSM has indicated that sexual risk behavior occurs mostly within sexual situations that compromise personal intentions to practice safer sex such as sexual activity that is used to alleviate feelings of isolation or psychological distress.[8] They then found that social oppression among Latino MSM, including sexual stigma, was associated with sexual risk behavior by way of psychological distress and participation in difficult sexual situations. Sexual stigma may thus place individuals not living with HIV at

significant risk of HIV and STI acquisition and individuals living with HIV at risk of STI acquisition.

Stigma-Mental Health-Sexual Risk Behavior Relationship

One possible explanation for the sexual stigma-sexual risk behavior association could be that this relationship is mediated by psychological processes. Studies among MSM have found that psychological distress, including anxiety, depressive symptoms and suicidality, mediated the sexual stigma-sexual risk behavior association.[8,36,39] Individuals experiencing poor mental health as a result of sexual stigma use condoms less frequently because of lowered self-esteem,[40,41] feelings of hopelessness or fatalism,[6,427,28] a need for validation or emotional contact,[7,28] and sexual sensation seeking,[40] all of which may become barriers to the development of positive attitudes and intentions related to protective behavior. A study of nonmonogamous MSM in San Francisco, CA found that participants who had engaged in condomless sex used sex significantly more of the time to cope with stressful situations than those not reporting condomless sex.[43] And yet, studies have also found poor mental health to have an insignificant or negative relationship with increased sexual risk behavior[44,45] and several studies have failed to find that mental health mediated the sexual stigma-sexual risk behavior association among MSM living in SSA,[36,46,47] suggesting a need for further research investigating this pathway.

Sexual stigma-Mental Health-Sexual Risk Behavior-HIV/STI Pathways

Although there a number of studies linking sexual stigma to mental health and sexual-risk behavior, and sexual stigma to sexual risk behavior mediated by mental health, very few studies have been able to link sexual stigma to HIV/STIs by way of both mental health and sexual risk behavior as mediators. Additionally, most studies that have assessed mental health as a mediator have only assessed depression and not suicidal ideation. A path analysis including transgender women from three West African countries found that a variety of sexual stigma manifestations labeled social stigma was associated with condomless sex but condomless sex did not mediate the social stigma-HIV prevalence association.[46] A study of MSM in Lesotho found that while social stigma was associated with both depression and HIV prevalence, depression did not mediate the stigma-HIV prevalence association.[48] Given the lack of data finding an association between sexual stigma and HIV/STIs by way of suicidal ideation and sexual risk behavior, there is a need for more evidence to explain how these factors may lie in the pathway between sexual stigma and onward transmission of HIV and STIs.

The objectives of this study were to assess: 1) if sexual stigma towards Nigerian MSM is directly associated with HIV and STI incidence and 2) if the sexual stigma-HIV/STI incidence association is mediated by mental health and sexual risk behavior in the form of suicidal ideation and condomless sex. Research explicating if and how this structural factor is associated with HIV/STI incidence would facilitate our ability to create programs that minimize the negative impact of sexual stigma through targeted intervention.[49]

Methods

Study Design and Data Collection Procedures

The TRUST/RV368 study is a prospective cohort that utilizes respondent driven sampling (RDS) to recruit MSM into a comprehensive model of HIV prevention, treatment, and care services in Nigeria as previously described.[1] Eligibility criteria included individuals who: 1) were born male; 2) were at least 16 years old; 3) had a history of insertive or receptive anal sex within the last year; 4) agreed to participate in the study for 18 months; 5) agreed to STI testing including for HIV; 6) were able to provide informed consent either in English or Hausa, and; 7) presented a valid RDS recruitment coupon. All participants provided written informed consent. Approval for the study was obtained by the Federal Capital Territory Health Research Ethics Committee, the University of Maryland Baltimore Institutional Review Board (IRB), and the Walter Reed Army Institute of Research IRB

From March 2013 to February 2016, 1,480 eligible participants completed the full baseline questionnaire, including questions on having ever experienced stigma, ever disclosing same-sex practices to family members, having ever thought of committing suicide (suicidal ideation), and any condomless sex with casual sex partners in the past 12 months. Participants were provided with HIV testing and counselling upon enrollment using a parallel algorithm of Determine® (Alere, Watham, MA, USA) and Uni-gold® (Trinity Biotech, Co-Wicklow, Ireland) and every three months thereafter. Urine and rectal swab specimens were also collected at enrollment and every three

months thereafter and tested for *Chlamydia tachomatis* (CT) and *Neisseria gonorrhoea* (GC) using the Aptima Combo 2® assay (Hologic, Bedford, MA, USA). This allowed for the assessment of incident HIV and STI infection. All individuals who had enrolled by February 2016 were included, therefore individuals who enrolled earlier would have longer follow-up periods than individuals who enrolled later, but data only includes the first incident infection for an individual in the case of STIs. We developed three incidence measures, which were HIV incidence (any positive HIV infection over the course of the study following a negative result at baseline), STI incidence (any positive CT and/or GC infection following a negative result over the course of the study), and HIV and/or STI incidence (a composite measure of the first two incidence measures). Analysis was conducted using STATA Version 13 (College Station, TX) and MPlus Version 7.4.[50] Disclosure was included as a covariate of sexual stigma as it may trigger stigmatization. It was assessed with the question "Have you told any member of your family that you have sex with other men or that you are attracted to other men?" Suicidal ideation was measured by asking "Have you ever felt like you wanted to end your life?"Condomless sex with casual sex partners was assessed with the question "How often are condoms used when you have anal sex with men who are casual partners?" Answer options of never, almost never, about half the time, and almost always were categorized as condomless sex. Individuals who had not have a casual sex partner in the last 12 months and individuals who had always used condoms with casual partners were categorized as consistent condom users.

Analyses

Creation of three stigma subgroups

Nine stigma indicators were chosen that were representative of stigma that has been found to be prevalent in the US, Western Africa, and Southern Africa.[51] In a previous analysis with this sample, these nine indicators were utilized to create three latent stigma classes using latent class analysis (LCA)(Chapter 3). For this study, predicted class probabilities (posterior probabilities) from that LCA were used to determine each participant's most likely class (modal class) and resulting analyses were conducted using modal class.[52] In effect, the latent stigma class variable was converted into a manifest variable with three categories of low (n=633), medium (n=663), and high (n=184) stigma.

Bivariate associations between stigma subgroups and model variables

Chi-square goodness of fit testing was used to determine if the proportion of the following variables differed by stigma subgroup at $p<.05$ significance level: disclosure of same-sex practices, suicidal ideation, condomless sex, HIV incidence and STI incidence.

Mediation Model

The pathways in the model were chosen based on a priori theoretical and empirical evidence. Path analysis was used to test whether a sexual stigma-HIV/STI incidence association was partially mediated by suicidal ideation and condomless sex.

Disclosure of same-sex practices was entered into the model as a covariate of stigma since a previous analysis found that disclosure was strongly positively associated with the stigma classes that formed the basis of this analysis (Chapter 3). A direct association between sexual stigma and HIV/STI incidence was entered into the model to allow for the likelihood that the relationship between stigma and HIV/STI incidence is also explained by factors other than suicidal ideation and condomless sex. A test of whether a larger model (with the direct association between stigma and HIV/STI incidence included in addition to the indirect associations) had better fit than a smaller model (without the direct association) was conducted using a robust chi-square model difference test. The path analysis produced standardized regression estimates and standard errors (SEs) and was clustered by city using the cluster command in MPlus, which uses a sandwich procedure to calculate robust errors.[50] Model fit was assessed using the following criteria: χ^2 goodness-of-fit test p-value>.05, Root Mean Square Error of Approximation (RMSEA)<.05, Comparative Fit Index (CFI)>.90, and Tucker-Lexis Index (TLI) >.90.

Results

Bivariate analysis revealed that increasing sexual stigma was associated with increasing HIV and STI incidence in a dose response association, although differences were not significantly for HIV incidence (HIV: 2.8%, 3.2%, 3.8% p-value=.798; STIs: 8.1%, 12.2%, 16.3% p-value=.003) (Figure 1). Sexual stigma was significantly positively associated with all other variables except for condomless sex where levels of condomless sex for those in the high and medium stigma groups were similar to each

other, but both were higher than for those in the low stigma group (condomless sex: 48.7%, 55.1%, 54.4% p-value=.063).

The chi-square difference testing comparing the larger model to the smaller model was significant at p-value<.001, suggesting that the larger model with a direct relationship between stigma and HIV/STI incidence, in addition to the indirect associations, had better fit than the smaller model without a direct association. Figure 2 presents the path model with standardized regression estimates and SEs for all estimated direct paths. The model had good fit across all fit statistics (χ^2 p-value= .210, RMSEA=.017, CFI=.999, and TLI=.998). There was a statistically significant total effect of stigma on HIV/STI incidence (standardized estimate .129, SE .026, p-value <.001), which included a significant direct path between stigma and HIV/STI incidence (standardized estimate .125, SE .027, p-value <.001) and a significant indirect path from stigma to HIV/STI incidence through suicidal ideation and condomless sex (standardized estimate .004, SE .001, p-value <.001). MSM in the higher stigma groups at study baseline were more likely to contract HIV/STIs over the course of the study, and this was partially explained by higher stigma being associated with reporting suicidal ideation, suicidal ideation being associated with condomless sex in the past 12 months, and condomless sex being associated with HIV/STI incidence.

Discussion

In this study we found that sexual stigma was associated with HIV and STI incidence in a dose-response association, which may be suggestive of a causal relationship. Although previous studies have found sexual stigma among MSM in SSA to

be associated with HIV prevalence,[12–14] no studies that we are aware of have found sexual stigma to be associated with incidence. The current study addressed this limitation and extended the literature by exploring mechanisms that help to explain the stigma-HIV/STI incidence association. The path analysis model revealed that having ever disclosed same-sex practices to family members was associated with higher levels of stigma among MSM; MSM who had experienced higher levels of stigma were more likely to have thought of committing suicide; those who had ever thought of committing suicide were more likely to have had condomless sex with casual sex partners in the past 12 months, and those who had had condomless sex with casual sex partners in the past 12 months were more likely to have an incident HIV and/or STI infection. The direct association between stigma and HIV/STI incidence remained significant in the model, suggesting the existence of other unmeasured factors that also contribute to this association that should be explored in future research in order to fully explicate the mechanisms linking sexual stigma to HIV/STI incidence. We found that sexual stigma was associated with very high levels of suicidal ideation. While there is evidence for this in higher-income countries,[16,26,27,53] there is a paucity of data on mental health among Nigerian MSM. This finding highlights the importance of addressing the mental health of MSM in HIV and STI programming in Nigeria, which could be done by providing mental health screening and treatment, peer-led support groups, and sensitization training to providers in venues serving MSM.

Disclosure of same-sex practices has previously been found to be positively associated with sexual stigma and suicidal ideation.[21,51,54] MSM and transgender individuals who are more visible, either because they disclose their same-sex practices

more often or because they are gender non-conforming, are likely to be at particularly high risk for stigma and poor mental health.[46,49] Interventions focused on the needs of these vulnerable groups and policies that enable disclosure safely are urgently needed in order to reduce subsequent HIV/STI acquisition and transmission. In order for disclosure to occur, decriminalization of same-sex practices should be promoted and the legality of providing care to MSM needs to be made clear to providers. A study of the impacts of sexual stigma in Senegal following the arrests of MSM health workers found that some providers discontinued health services for MSM out of fear that they would be targeted by the media and would suffer retribution, resulting in disruptions in HIV services for many MSM.[55] Additionally, MSM need services that are adequately private and which respect their confidentiality and if they do not perceive that disclosure to providers is safe they often delay seeking HIV services or do not participate in prevention programs.[49,56–58]

Results support theoretical and empirical work that finds that poor mental health caused by sexual stigma may exacerbate sexual behavior that puts one at risk of HIV and STIs. These psychological processes may inhibit individuals from consistently using condoms by causing them to 1) feel that they do not have control over their future, 2) expect negative experiences to happen to them such as acquiring HIV, 3) care less about the consequences of their actions, and/or 4) seek out sex partners for validation and emotional contact as a coping mechanism.[28,40,41,43,59] Psychological distress may also interfere with recall of information relevant to self-protection, accurate risk appraisal, and problem solving skills[42] which reduces their ability to utilize health information provided to them in order to protect themselves.

Hatzenbuehler's psychological mediation framework posits that sexual stigma causes or exacerbates poor mental health through cognitive processes activated by sexual stigma, such as hopelessness.[6] Hopelessness is the belief that negative events will occur and there is nothing the individual can do to change the situation. Studies have found that hopelessness is a key contributor to suicidal ideation, even more strongly associated with suicidal ideation than is depression.[23,24,60] Intervention strategies that may counteract suicidal ideation include improving problem solving skills and appraisal, as deficits in this have been shown to lead to hopelessness and subsequent suicidal ideation,[60] ensuring that psychologists and peer support groups are available to counsel MSM clients, which may alleviate feelings of social isolation, loneliness and hopelessness found to lead to suicidal ideation,[49] and improving MSM clients' self-efficacy to negotiate safe sex within their sexual relationships, particularly in difficult situations that compromise personal intentions to practice safer sex.[8]

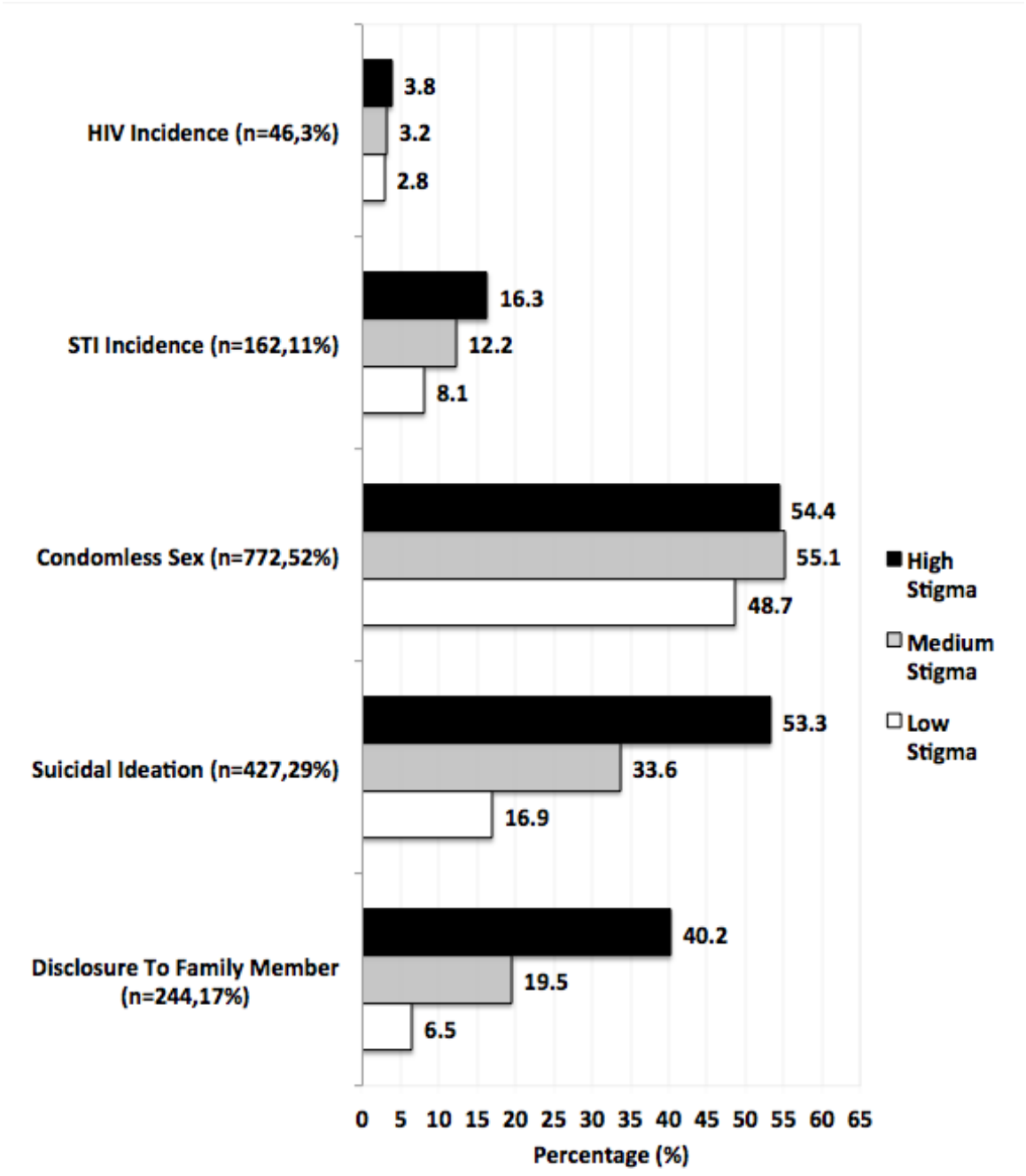
There are several limitations in these analyses. The LCA that produced the three stigma classes had moderate entropy, which is a measure of classification accuracy.[61] This means that some people may have been misclassified. Despite this, this measure of stigma subgroups encompasses a variety of manifestations of stigma that have been found to be common across different countries and these stigma classes were found to be associated with HIV and STI prevalence in an earlier analysis (Chapter 3). We were not able to assess the role of internalized homophobia in our model, but we were limited by what data was collected. The analyses could also have been strengthened by adding other measures of mental health, such as validated scales assessing depressive and anxiety symptoms. Despite this we feel that the use of suicidal ideation was

illustrative for several reasons: 1, it allowed us to directly compare levels of suicidal ideation among this sample of MSM to the general adult population in Nigeria; 2, suicidal ideation is strongly associated with other cognitive processes that make using a condom especially difficult such as hopelessness and deficits in problem-solving skills; and 3, suicidal ideation is strongly predictive of suicide, which is a serious health issue globally.[23,60,62] Another limitation was that our sample size for HIV incidence was low limiting our ability to assess the model for HIV and STI incidence separately. Future studies with larger samples should examine this model with HIV and STI incidence as separate outcomes.

Although there is now widespread recognition that sexual stigma is a barrier for combatting the HIV/AIDS epidemic,[63] rarely have studies included robust measures of incidence collected from an MSM cohort or explicated a pathway by which to understand how sexual stigma may promote onward transmission of HIV/STIs that accounts for sexual stigma's impact on mental health and sexual behavior. The finding that sexual stigma was associated with very high levels of HIV, STIs, suicidal ideation, and condomless sex, and that these variables were significantly interrelated in a mediation model illustrates multiple opportunities for intervention that could be combined into multilevel interventions to reduce HIV/STI incidence, an approach which is currently rare in SSA where there has been limited attention given to sexual stigma affecting MSM.[2] Interventions which only address incidence through biomedical intervention may be limited in success as these in isolation do not address sexual stigma or its mental health impacts. This calls for the meaningful integration of stigma mitigation strategies into combination HIV programming for Nigerian MSM, such as

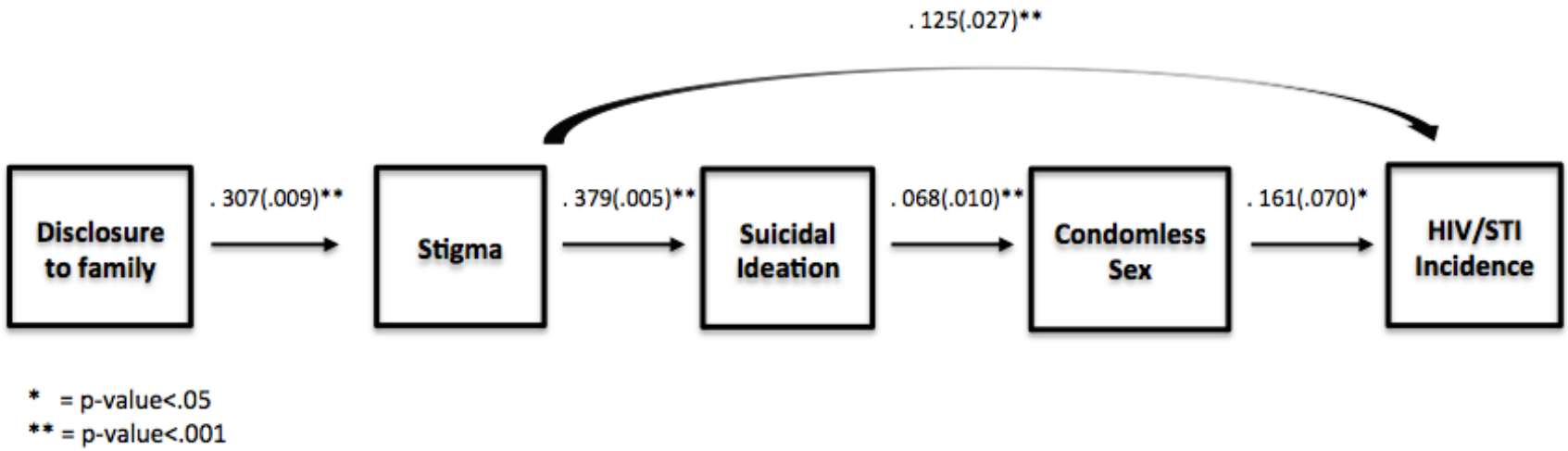
integrating sensitization training to providers on issues specific to MSM, human rights, and gender; integrating psychosocial support at venues serving MSM as a standard of care; screening for sexual stigma and having psychological and legal referrals on hand if the needs of MSM exceed the psychosocial support available on site; respecting the privacy and confidentiality concerns of MSM; and building self-efficacy among MSM as part of a resiliency-based approach which could minimize deficits in problem-solving skills and reduce feelings of hopelessness.

Figure 6. Direct associations between stigma classes and other variables in the mediation model in a sample of Nigerian men who have sex with men



Differences are significant at p<.05 for all variables except HIV incidence and condomless sex. Suicidal ideation is missing 4 and condomless sex with casual partners is missing 3.

Figure 7. Path analysis of the association between sexual stigma and HIV and/or sexually transmitted infection incidence among a sample of Nigerian men who have sex with men: standardized regression estimates and standard errors



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Chapter 5: Manuscript 3

The synergistic impact of sexual stigma and suicidal ideation on HIV testing among Nigerian men who have sex with men

Abstract

Background

Although studies have found that sexual stigma is prevalent among Nigerian men who have sex with men (MSM) and undiagnosed HIV infection is high, no studies have explored the relationship between sexual stigma and HIV testing and whether this relationship may partly be explained by synergistic effects between sexual stigma and psychological factors. The study assessed if suicidal ideation moderated the relationship between sexual stigma and HIV testing.

Methods

Beginning in 2013, the TRUST/RV368 study recruited 1,480 MSM using respondent driven sampling in Nigeria into a prospective cohort that provides HIV/STI diagnosis and treatment. A previously assessed sexual stigma latent variable including low, medium, and high stigma classes was the primary independent variable. Direct relationships between sexual stigma, suicidal ideation, and HIV testing were tested using latent class with distal outcome modeling. An interaction between stigma class and suicidal ideation on the outcome of HIV testing were tested using latent transition analysis.

Results

Stigma was not significantly associated with HIV testing. Suicidal ideation was associated with less HIV testing (AOR .79 p-value<.001). High stigma in conjunction with suicidal ideation was associated with less HIV testing (AOR .65 p-value=.543) and medium stigma in conjunction with suicidal ideation was significantly associated with less HIV testing (AOR .46 p-value<.001).

Conclusion

Suicidal ideation and sexual stigma had a synergistic negative impact on HIV testing. This suggests that in order to reduce undiagnosed HIV infection, strategies which address both sexual stigma and poor mental health, such as improved screening and treatment of poor mental health, should be integrated within combination HIV programs for MSM.

Introduction

In 2013, UNAIDS announced a plan to end the AIDS epidemic by 2030 through the implementation of the Fast Track targets of 90-90-90 by 2020, which is that by 2020 90% of people living with HIV will know their HIV status, 90% of people who know their status will be receiving HIV treatment, and 90% of people on HIV treatment will have a suppressed viral load.[1] Knowledge of one's HIV status is the first target and is important because once individuals learn of their HIV infection they may engage in treatment and care, and may also engage in behavior change that is protective of themselves and others.[2] Globally, there is growing recognition that engaging key populations, such as men who have sex with men (MSM), is important to the achievement of the UNAIDS 90-90-90 goals and that achieving such high levels of diagnosis, treatment, and viral suppression may be especially difficult among these populations.[1] Therefore, it is especially important that we better understand barriers for key populations that impede achievement of the UNAIDS targets such as sexual stigma and poor mental health, which may inhibit engagement with services such as HIV testing. Currently, these factors and their combined effect on HIV testing remain underexplored.

Sexual stigma is the co-occurrence of labeling, stereotyping, separation, status loss, and discrimination within a power imbalance specific to stigma affecting sexual minorities due to their same-sex sexual practices.[3] It manifests at the structural level in the form of heterosexism and at the individual level as enacted, felt, and internalized stigma.[4] Enacted stigma refers to overt or objective behavioral expressions of stigma whereas felt stigma refers to expectations of stigma in different situations and the

vigilance this expectation requires. Stigmatizing social attitudes and policies create permissive environments for the abuse of sexual minorities and have been shown to affect health and behavior. Greater sexual stigma and the existence of policies that criminalize same-sex practices are associated with less HIV testing among MSM in several large multi-country studies,[5–8] but no similar quantitative studies exist that are specific to MSM in sub-Saharan Africa (SSA). Qualitative studies of MSM in SSA have repeatedly found that sexual stigma discouraged MSM from seeking HIV testing and care in Uganda,[9] South Africa,[10,11] Senegal,[12] Cameroon,[13] and Swaziland,[14] but it is not clear what mechanisms increased or decreased the likelihood that sexual stigma negatively impacted HIV testing. A better understanding of moderators of the sexual stigma-HIV testing association would help explain variability in outcomes.

Poor mental health may be one mechanism linking sexual stigma to HIV testing among MSM. There is a large body of research finding that sexual stigma is associated with poor mental health among MSM[15–17] and yet very few studies have included both mental health and sexual stigma within models that explain low levels of HIV testing.[18] MSM with poor mental health may be less motivated to or capable of engaging with HIV testing.[11,19–21] Victimization of MSM, a type of enacted sexual stigma, often affects general psychological processes within victims.[22] Victimization affects mental health by interfering with everyday processes through which individuals are able to feel secure, that "it can't happen to me;" Victimization also interferes with individuals' perceptions of the world as an orderly and meaningful place which can lead to self-blame, and it can make individuals question their own worth.[23] General psychological process impacted by sexual stigma can exacerbate psychological distress by causing feelings of

hopelessness, lower self-esteem, and fatalism which may inhibit protective health behavior.[4,22] Sexual stigma may also cause stressors that are additive to general stressors and which lead to hypervigilance and the utilization of strategies to minimize sexual stigma that are a result of fear that enacted stigma may occur.[4,15] Such hypervigilance may cause MSM to avoid settings likely to result in further sexual stigma such as health care facilities.[21,24,25]

One critical indicator of poor mental health that may help explain the link between sexual stigma and HIV testing is suicidal ideation. Suicidal ideation is associated with sexual stigma and with a very serious outcome, suicide. Globally, suicide accounts for 50% of all violent deaths in men and 71% in women, and suicide is the second leading cause of death in 15-29 year olds.[26] Suicidal ideation among MSM who have experienced sexual stigma in SSA may inhibit HIV testing through suicidal ideation's association with other cognitive processes such as depression, lower self-esteem, and hopelessness.[27,28]

One country where it may be especially important to assess the interrelationship of sexual stigma and suicidal ideation on HIV testing is Nigeria. Nigeria has the second highest number of people living with HIV/AIDS in SSA and it is one of the 30 countries that account for 89% of all new HIV infections globally.[1,29] One of the groups at highest risk for HIV in Nigeria are MSM, with high levels of undiagnosed HIV infection.[30] In January 2014, Nigeria passed a law further criminalizing same-sex practices, the Same Sex Marriage (Prohibition) Act of 2013.[31] It is one of the most extensive laws criminalizing same-sex practices globally and a study of its effects found that MSM reported fear of seeking healthcare and avoidance of healthcare at significantly higher

levels post-law as compared to pre-law.[32] Suicidal ideation has not been assessed among Nigerian MSM, but reported levels are high among MSM in South Africa,[33] Uganda,[34] and Swaziland.[21] In a study of suicidal behaviors among adult Nigerians, suicidal behaviors were significantly associated with mental disorders and a history of physical abuse.[35] Of those with a lifetime history of ideation, an estimated 30% made an attempt.

Given the evidence that sexual stigma is associated with less HIV testing and that sexual stigma is associated with negative psychological processes, studies are needed that assess whether poor mental health in the form of suicidal ideation is part of the pathway that explains lower levels of HIV testing among MSM in countries with high levels of sexual stigma such as Nigeria. In order to assess whether Nigerian MSM who had experienced sexual stigma and poor mental health were less likely to have received an HIV test, we assessed: 1, if sexual stigma was associated with HIV testing and with suicidal ideation directly, 2, if suicidal ideation was associated with HIV testing directly, and 3, if suicidal ideation moderated the relationship between sexual stigma and HIV testing.

Methods

Study Design and Participants

The TRUST/RV368 study is a prospective cohort study that utilizes respondent driven sampling (RDS) to recruit MSM into a comprehensive model of HIV prevention, treatment, and care services in Nigeria that has been previously described.[36] Eligibility

criteria includes individuals who: 1) were assigned the male sex at birth, 2) are at least 16 years old for the Abuja site and at least 18 for the Lagos site, 3) have a history of insertive or receptive anal sex within the last year, 4) provide informed consent either in English or Hausa, and 5) present a valid RDS recruitment coupon. MSM from Abuja and Lagos, the two largest cities in Nigeria, were recruited.

From March 2013 to February 2016, 1,480 eligible participants completed the full baseline questionnaire. All variables were collected at baseline. Written informed consent was obtained from all participants. Approval for the study was obtained by the Federal Capital Territory Health Research Ethics Committee, the University of Maryland Baltimore Institutional Review Board (IRB), and the Walter Reed Army Institute of Research IRB.

Measures

Nine indicators of stigma were included as an aggregate measure of stigma that has been previously assessed(Chapter 3). The aggregate stigma measure included seven types of enacted stigma (family made discriminatory remarks, rejection from friends, refusal from police to protect, verbal harassment, blackmail, physical violence, and rape) and two types of felt stigma (fear of seeking health care and fear of walking in public) that participants felt were due to the fact that they had sex with men. Suicidal ideation was measured by asking "Have you ever felt like you wanted to end your life?" HIV testing was measured by asking "Have you ever been tested for HIV infection?" Having ever received an HIV test during one's lifetime remains relevant in countries such as Nigeria where reported levels of HIV testing are low.[30,37]

Participant characteristics found to be associated with sexual stigma in a previous analysis with this sample (Chapter 3) were included as covariates of sexual stigma: age (<25 vs ≥25), self-reported gender (male, female, both male and female), RDS recruitment wave, and knowledge of HIV transmission risk. RDS recruitment wave was included in order to account for changing participant characteristics as sampling progresses to harder-to-reach subpopulations in later waves[38] and was dichotomized based on enrollment during the first or second half of sampling waves. For knowledge of HIV transmission risk, participants were asked "Which type of anal sex position puts you most at risk for HIV infection? Insertive, receptive, or insertive and receiptive carry equal risk?"

Analyses

The present study includes data from a latent class analysis that was conducted with nine indicators of stigma and which produced a latent sexual stigma measure consisting of low, medium, and high stigma classes (Chapter 3). Separate models were run to assess the relationship between sexual stigma class and suicidal ideation and stigma class and HIV testing, adjusting for age, self-reported gender, RDS recruitment wave, and knowledge of HIV transmission risk, using latent class with distal outcome modeling. For all models including HIV testing, those previously aware of their HIV positive status at enrollment were then excluded from the analysis. These models, and the subsequent models, were run clustering for city using a sandwich estimator to account for the potential correlation between participants of the same city.[39]

A model was run to assess main effects for the direct association between suicidal ideation and HIV testing, including in the model the direct association between stigma class and HIV testing, and adjusting stigma class by age, self-reported gender, RDS recruitment wave, and knowledge of HIV transmission risk, and excluding those previously aware of their HIV status at enrollment, using latent transition analysis (LTA). LTA is traditionally used with longitudinal data to quantify the incidence of transitions between latent statuses from one time to another.[40] Although we did not use longitudinal data in this analysis, we chose to use LTA because it allows the regression of a latent variable on another latent variable. In this study, HIV testing was treated as a perfectly measured latent variable in order to allow for the assessment of the relationship between stigma class and HIV testing. When doing LTA with cross-sectional data, transition probabilities convert in their meaning to signify the probability of different class combinations (e.g. the probability that individuals in the high stigma class have also had an HIV test).[41]

Figure 1 depicts the final analytical model from which we derived interaction effects. In the final model, we had a latent stigma class variable adjusted for participant characteristics as the primary predictor variable. A perfectly measured HIV testing variable is regressed on stigma class and on suicidal ideation separately. Lastly, HIV testing is also regressed on an interaction between suicidal ideation and stigma class (the interaction effects). Interaction results help indicate "when" and "for whom" a variable most strongly predicts an outcome and must be accounted for as main effects tell an incomplete story in the presence of significant interaction.[42]

Results

Direct associations

Table 1 presents the prevalence of each outcome by stigma class and whether differences between classes were significant. Differences were not significant for HIV testing, although the prevalence of HIV testing went up as stigma class increased in severity (56%, 63%, 65%, overall χ^2 p-value=.196). There was a strong dose-response association between stigma class and suicidal ideation (17%, 31%, 50%, overall χ^2 p-value<.001).

Main and interaction effects

Figure 1 shows main and interaction effects. Suicidal ideation was associated with a 21% lower odds of having been tested for HIV, irrespective of the stigma class of any participant (p-value<.001). Interaction effects show that elevated stigma in conjunction with suicidal ideation had a synergistic effect and was associated with even lower reporting of HIV testing. Being in the high stigma class and reporting suicidal ideation was associated with a 35% lower odds of HIV testing as compared to being in the low stigma class and reporting suicidal ideation (p-value=.543). Being in the medium stigma class and reporting suicidal ideation was significantly associated with a 54% lower odds of HIV testing as compared to being in the low stigma class and reporting suicidal ideation (p-value<.001).

Discussion

This study found a strong dose-response association between sexual stigma and suicidal ideation, expanding on the growing body of theoretical work and empirical evidence demonstrating that sexual stigma is an important driver of poor mental health by including Nigerian MSM. Individuals who reported suicidal ideation had a significantly lower odds of having received an HIV test. Although previous studies have focused on assessing the impact of poor mental health on the onward transmission of HIV by assessing how poor mental health contributed to non-adherence and disease progression among HIV infected individuals,[43] this study indicates that poor mental health may also drive HIV infection by reducing HIV testing. Suicidal ideation in conjunction with sexual stigma was associated with a significantly lower odds of having ever been tested for HIV than for individuals with suicidal ideation and low levels of sexual stigma. By looking at the interaction between sexual stigma and suicidal ideation, this study enriches the existing research exploring if sexual stigma is associated with less HIV testing by exploring how and under what conditions sexual stigma is associated with less HIV testing. In order to achieve 90-90-90 among Nigerian MSM, HIV programs may need to integrate both mental health services and sexual stigma mitigation strategies rather than addressing either of these issues in isolation.

The levels of suicidal ideation were very high in this sample, as was found among MSM in other studies in SSA.[21,33,34] In comparison, a study including a representative sample of Nigerian adults found that the prevalence of suicidal ideation was 3.2%,[35] therefore suicidal ideation may be a more significant problem for Nigerian MSM than for the general population. The high levels of suicidal ideation among all three stigma

classes are alarming as suicidal ideation may lead to death. The study of suicidal ideation among Nigerian adults found that 30% of individuals who reported suicidal ideation went on to make an attempt.[35] Few studies have assessed the association between sexual stigma and mental health among MSM in SSA. A study comparing suicidality between sexual minorities and heterosexuals across five continents found that MSM reported significantly higher levels of suicidal ideation in four of the five continents, but that study excluded Africa.[44] Research is needed to better elucidate how sexual stigma and other factors may be contributing to high levels of suicidal ideation among Nigerian MSM. The recent passing of the Same-Sex Marriage (Prohibition) Act may be furthering poor mental health among MSM. The Act makes it punishable to register, operate or participate in gay clubs, societies or organizations and anyone who witnesses or abets this is also liable to be sent to prison.[31] This part of the law may further exacerbate poor mental health among Nigerian MSM by preventing their access to support networks of their peers. The passing of the law has also been associated with increased anti-gay rhetoric, arrests, and violence towards Nigerian MSM,[31,45] which may worsen already high levels of suicidal ideation and reduce HIV testing at a time when efforts to include key populations within HIV programming are even more critical to combatting HIV/AIDS.

The negative association of sexual stigma in conjunction with poor mental health on HIV testing may be partly explained by cognitive processes among MSM that are caused by sexual stigma.[22] MSM who have been victimized by sexual stigma and who perceive the possibility of future sexual stigma, may experience substantial poor mental health, including suicidal ideation, which prevents them from engaging in self-care

behaviors and causes them to fear settings where they could be retraumatized. Studies have shown that sexual stigma led to delayed health care seeking and the development of strategies around trying to avoid stigmatizing health care workers among MSM in SSA, including traveling far to locate MSM-friendly services and non-disclosure.[11,20,21] In a qualitative study in Swaziland, HIV positive MSM felt that health care providers' questions assumed heterosexuality.[14] They felt afraid to mention male sex partners and therefore did not bring partners in for care. In a mixed methods study of MSM in China, some MSM said they would not participate in HIV prevention programs because they were afraid that they would be "outed" as gay due to the association of HIV with being gay.[24] In another study of Chinese MSM, among those that had never been tested for HIV, 47% said they had not been tested because they were worried that people might find out about their homosexuality.[25] It may be of especial utility to integrate trauma-informed approaches, such as mental health screening and processes to prevent retraumatization of MSM clients, as a standard of care within public health programs serving Nigerian MSM.

There were a couple unexpected findings of note. The overall lack of association between stigma and HIV testing was surprising given that previous studies have found a negative association.[5,6] There may be several explanations for this. Previous studies were among MSM in countries other than Nigeria, primarily in higher-income countries, and they used different measures of sexual stigma that may not be generalizable to MSM in SSA. Additionally, previous analysis of our data found that those in the high stigma class had larger MSM social networks, were more likely to have disclosed their same-sex practices, and appeared to be better linked to HIV-related services than those

in the medium and low stigma classes (Chapter 3), which may explain the positive trend between sexual stigma and HIV testing in this study, although it did not reach significance. Because the data was cross-sectional and our measures asked about experiences over their lifetime, we could not accurately assess if sexual stigma actually led to decreased levels of HIV testing. Future studies should assess sexual stigma, suicidal ideation, and HIV testing behavior using longitudinal data in order to evaluate if there are causal relationships.

It was also somewhat surprising that individuals who experienced high sexual stigma along with suicidal ideation did not report lower levels of HIV testing than individuals who experienced medium sexual stigma along with suicidal ideation. The variability in stigma experienced by each class, the differing participant characteristics by class, and the substantially different sample sizes for the high (n=195) and medium (n=680) stigma classes may help account for why interaction effects were not the same for the high and medium stigma classes. Additionally, the interaction effect for MSM in the medium stigma class may have been more negative in part because these MSM did not appear to be as well connected to other MSM and to sexual minority-serving organizations that provide HIV testing.

There were several limitations in this study. A mediation analysis rather than an interaction analysis may have given us different insights about the pathways linking sexual stigma to HIV testing, but given the cross-sectional study design an analysis of interaction appeared more appropriate. An interactional approach was also more appropriate from a theoretical stance. Syndemic theory states that there are synergistic effects due to the interaction of diseases or health problems and not merely their co-

occurrence.[46] This points to a need to utilize interaction analysis rather than what is commonly utilized in syndemics research where health problems are added together.[47,48] Therefore, the use of interaction to assess the synergistic effect of sexual stigma with suicidal ideation in this study is a methodological strength. The generalizability of the findings to MSM in high-income countries may be limited. Accessing MSM-friendly health providers and disclosure of same-sex practices may be even more difficult and associated with even greater fear for MSM in Nigeria than in settings where same-sex practices are legal. A study assessing sexual stigma across several regions found that in the US disclosure of same-sex practices to a health care worker was associated with decreased fear of seeking health care or avoidance of health care as compared to those who had not disclosed.[49] In contrast, for MSM in West Africa and Southern Africa, disclosure to a health care worker was associated with increased fear of seeking health care, avoidance of health care, and poor treatment within health care settings as compared to those who had not disclosed.

This study contributes to a growing understanding that achieving the 90-90-90 targets may be unachievable if sexual stigma remains unaddressed.[1] Sexual stigma in conjunction with having thought of committing suicide was associated with a much lower odds of having received an HIV test than having experienced sexual stigma alone or having thought of committing suicide alone. Interventions to address both sexual stigma and poor mental health should be integrated into combination HIV programming. A number of strategies could potentially increase HIV testing among Nigerian MSM by addressing trauma, providing mental health services, sensitizing providers, and providing peer-driven psychosocial support. Integrating a trauma-

informed care approach as the standard of care within programs serving MSM has the potential to empower clients and help them develop resiliency that may buffer against the negative impacts of sexual stigma.[50] Sensitization training for health providers has been shown to improve providers' abilities to provide service in a non-stigmatizing way to MSM[51] and such trainings should be given to providers at facilities that care for the general public as MSM-friendly providers may not always be accessible. An intervention that trained providers on how to appropriately screen and refer MSM and transgender clients who have experienced violence in Mexico and Thailand could be adapted to the Nigerian context.[52] It was successful in that it was widely accepted by providers, identified high levels of violence, improved communication and trust between providers and patients and improved collaboration between health providers and sexual minority-serving organizations. Additionally, MSM need psychosocial support from their peers, which could be implemented through support groups and peer education. Peer-driven interventions for MSM have been associated with improved HIV knowledge, safer sexual behaviors, increased HIV testing, and reduced feelings of loneliness, social isolation, and low self-esteem.[53–56] Achieving high levels of HIV testing among Nigerian MSM requires addressing sexual stigma and poor mental health before MSM become HIV infected. This could be addressed through greater support of existing MSM-serving organizations that implement psychosocial support and the adaptation of programs shown to be successful elsewhere to minimize sexual stigma and poor mental health in settings outside of MSM-serving organizations.

Table 8. Distal outcomes across three latent classes of stigma, adjusting for participant characteristics, clustering by city, and excluding those previously diagnosed with HIV in a sample of Nigerian men who have sex with men

Table 1. Distal outcomes across three latent classes of stigma, adjusting for participant characteristics, clustering by city, and excluding those previously diagnosed with HIV in a sample of men who have sex with men: proportions, standard errors, overall model statistics and pairwise comparisons.

Distal Outcomes[a]	**%**	**SE**		**X^2**	**X^2 p-value**
HIV Testing[b]					
			Overall test	3.26	0.196
High Stigma Class	0.65	0.02	High Stigma vs. Medium Stigma	0.09	0.759
Medium Stigma Class	0.63	0.05	High Stigma vs. Low Stigma	2.50	0.114
Low Stigma Class	0.56	0.03	Medium Stigma vs. Low Stigma	3.69	0.055
Suicidal Ideation[c]					
			Overall test	**42.00**	0.000
High Stigma Class	0.50	0.04	High Stigma vs. Medium Stigma	**20.55**	0.000
Medium Stigma Class	0.31	0.02	High Stigma vs. Low Stigma	**62.18**	0.000
Low Stigma Class	0.17	0.02	Medium Stigma vs. Low Stigma	**22.59**	0.000

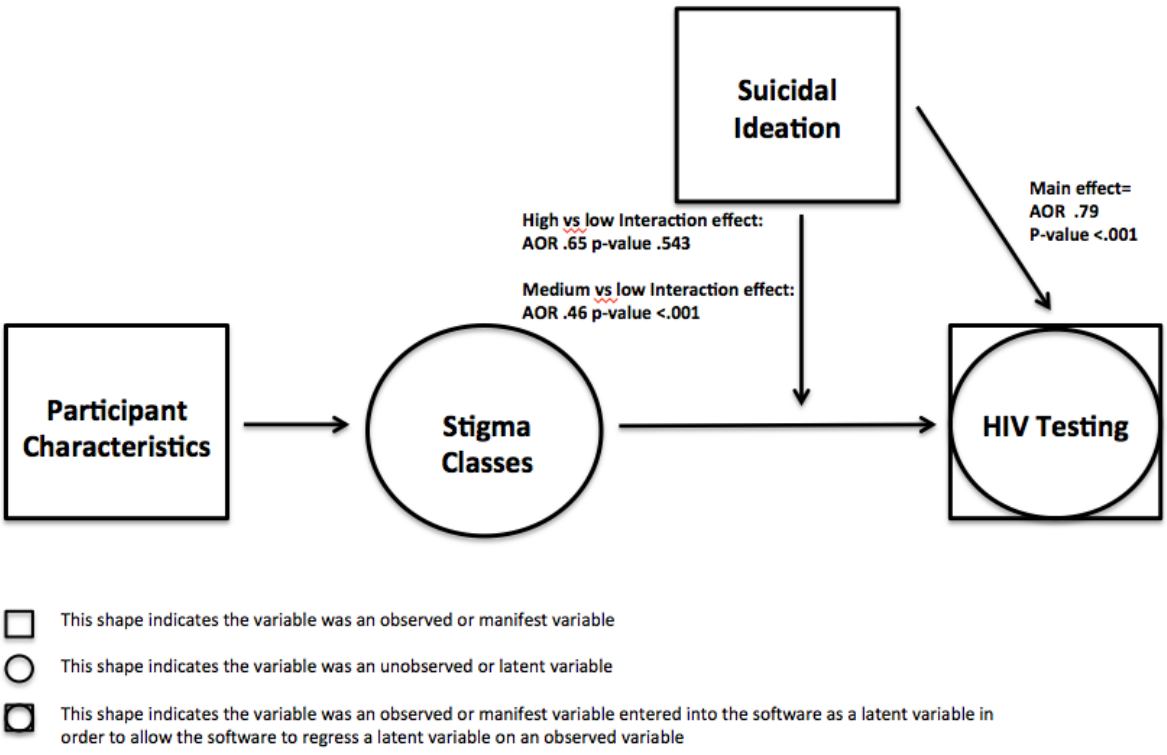
Boldface are significant at p<.05

[a]Each outcome is analyzed separately and includes adjustment for age, gender, recruitment wave, and knowledge of riskiest sex position.

[b] N=1059 because 74 participants that had a missing value for any of the variables in the analysis were excluded. This analysis excluded those that were already aware of the HIV diagnosis prior to enrollment into the study.

[c] N=1349 because 131 participants that had a missing value for any of the variables in the analysis were excluded.

Figure 8. Final model assessing the main effect of suicidal ideation with HIV testing and the interaction effects of suicidal ideation and sexual stigma with HIV testing, adjusting for participant characteristics and clustering for city



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Chapter 6: Conclusions

Public health work on the issue of sexual stigma among MSM is at a critical juncture that may make it more feasible than ever before to implement interventions to combat sexual stigma. In addition to having a stronger evidence base finding that sexual stigma is a driver of HIV/AIDS among MSM, there is now more political and financial support to address stigma globally. In 2014, UNAIDS announced its goal of "zero discrimination" within its plan to end the AIDS epidemic by 2030 through the implementation of the Fast Track targets of 90-90-90 by 2020.[1] In March of 2016, the US convened experts to think through how to address stigma in its National HIV/AIDS Strategy.[2] In June of 2016, the US President's Emergency Plan for AIDS Relief (PEPFAR), of which Nigeria is the largest recipient, announced a new $100 million investment fund to expand access to HIV prevention and treatment services for key populations.[3] In July of 2016 Nigeria's President appointed new Director Generals for five health institutions, including the National Agency for the Control of AIDS (NACA), which may provide new opportunities to address the health of MSM.[4] This confluence of factors makes it even more important that research highlighting potential intervention strategies addressing sexual stigma among Nigerian MSM be developed and disseminated.

This dissertation sought to improve measurement of sexual stigma and to investigate pathways by which sexual stigma is associated with onward transmission of HIV and STIs and inhibits HIV testing. It had three aims that formed the basis of the three manuscripts: 1, to characterize patterns of sexual stigma, explore if socio-

demographic and psychosocial characteristics are associated with stigma patterns, and evaluate if patterns are associated with HIV prevalence and STI prevalence and incidence, among all participants; 2, to identify indirect pathways linking sexual stigma to HIV and/or STI incidence by testing a model in which stigma and HIV and/or STI incidence are associated via suicidal ideation and condomless sex, among all participants; and 3, to identify if suicidal ideation moderates the association between sexual stigma and HIV testing, among participants not previously diagnosed with HIV. This chapter summarizes the study findings, describes the study's limitations and strengths, and discusses implications for future research and interventions.

Summary of Findings

Aim 1

Latent class analysis was conducted on data representing sexual stigma enacted and perceived experiences among MSM in Nigeria (n=1,480). Three classes were extracted that had the best fit, including low, medium, and high sexual stigma, with 59% of the sample having experienced elevated levels of sexual stigma. Class separation was moderate with an entropy of .67. There were both quantitative and qualitative differences, in that classes reflected a spectrum of severity and were also characterized by differences within classes. The high stigma class was characterized by high levels of physical and verbal harassment and fear of seeking health care was the one stigma indicator that was high across all three classes. The latent class regression found that participants who had disclosed same-sex practices, identified their gender as not male,

and who were previously diagnosed with HIV were significantly more likely to be in the high stigma class compared to the low stigma class. A dose-response association was found between stigma class and HIV prevalence (28%, 39%, 57%, χ^2 p<.001), STI prevalence (15%, 22%, 24%, χ^2 p=.040), and STI incidence (8%, 11%, 19%, χ^2 p=.023).

Aim 2

The three stigma classes extracted in aim 1 were used to place participants (n=1,480) into three observed stigma subgroups based on their most likely class. Direct associations were then tested between stigma subgroups and baseline variables (suicidal ideation, condomless sex with casual sex partners) as well as HIV and STI incidence using χ^2 tests. A theory-driven model was then tested, using path analysis, in which disclosure of same-sex practices to family led to stigma, stigma led to suicidal ideation, suicidal ideation led to condomless sex, and condomless sex lead to HIV and/or STI incidence, clustering by city. As stigma increased in severity, incident STIs increased in a dose response relationship (STIs: 8.1%, 12.2%, 16.3% p-value=.003). Incident HIV infection was less common and increased non-significantly with increasing severity of stigma (HIV: 2.8%, 3.2%, 3.8% p-value=.798). All direct relationships in the model were significant and suicidal ideation and condomless sex partially mediated the association between stigma and HIV and/or STI incidence. The model had good fit across all fit statistics (χ^2 p-value=.077, RMSEA=.021, CFI=.979, and TLI=.965)

Aim 3

The three stigma classes extracted in aim 1 were used to test whether sexual stigma was directly associated with having ever been tested for HIV and then a model was tested allowing for direct associations between sexual stigma and HIV testing and suicidal ideation and HIV testing as well as an interaction between sexual stigma and suicidal ideation on HIV testing. There was a dose-response association between stigma class and suicidal ideation (17%, 31%, 50%, overall χ^2 p-value<.001), but stigma was not significantly associated with HIV testing. Suicidal ideation was associated with less HIV testing (AOR .79 p-value<.001). High stigma in conjunction with suicidal ideation was associated with less HIV testing (AOR .65 p-value=.543) and medium stigma in conjunction with suicidal ideation was significantly associated with less HIV testing (AOR .46 p-value<.001), finding that sexual stigma in conjunction with poor mental health was associated with less HIV testing than reporting sexual stigma or poor mental health alone.

Limitations

There are a number of limitations in this study. Although the sample size was large for a study of MSM, it may be that had there been more participants and more stigma indicators included, the LCA would have identified more classes with greater nuance as indicated by the BLRT favoring a four class model. Even though we selected nine stigma indicators shown to be highly prevalent among MSM from different countries, it is also possible that important stigma indicators may have been omitted. Additionally, there may have been recall bias as participants were asked to reflect about

experiences across their lifetime. This study was limited in what it could say about participants who may identify as transgender. Future research is needed to assess gender variance in Nigeria and to better understand if the category of "transgender" accurately reflects local practices. I was not able to assess the role of a number of important constructs that have been found to be important to the assessment of sexual stigma and its impact on the health of sexual minorities such as internalized stigma, depressive and anxiety symptoms, and HIV stigma.

The LCA that produced the three stigma classes had moderate entropy, which is a measure of classification accuracy.[5] This means that some people may have been misclassified and this source of measurement error was not adjusted for in the SEM models. Additionally, class estimation may have been influenced by the auxiliary variables in the SEM. The RDS sampling method was based on initial participants drawn from a well-networked community-based organization. We did not adjust for the sampling method directly and this may have biased the sample in favor of more HIV positive participants who had experienced both HIV-related stigma and sexual stigma. Another limitation was that our sample size for HIV incidence was low limiting our ability to assess the model in aim 2 for HIV and STI incidence separately. It is unclear whether suicidal ideation is a mediator or a moderator of the sexual stigma-HIV testing association, but testing a mediation model would have been inappropriate given the temporal ambiguity of sexual stigma, suicidal ideation, and HIV testing. The generalizability of the findings to MSM in high-income countries may be limited due to differences in the legality of same-sex practices, cultural differences, and the availability of MSM-friendly health and social services.

Strengths

Despite these limitations, there were a number of strengths in these analyses. Many studies of sexual stigma among MSM in SSA have reported on small sample sizes, which reduced their power to conduct modeling methods such as LCA and SEM. In contrast, the parent study for this dissertation had enrolled a large sample of MSM. This study also included longitudinal data, which enabled us to test mediation models with greater certainty that our outcomes of HIV and STI incidence followed sexual stigma. Part of the reason why a number of previous studies failed to find an association with HIV prevalence may be due to not having longitudinal data. By utilizing latent variable modeling methods including LCA and SEM I was able to model sexual stigma as a latent variable in aims 1 and 3, to develop a more precise and nuanced classification of sexual stigma in aim 1, account for the measurement error in the LCA, LCR, and in the assessment of the association between sexual stigma and variables in the path analysis, and to test multiple dependent variables simultaneously. I used objective measures of HIV and STI prevalence and incidence rather than self-report, which would likely lead to under-reporting of the outcomes. I included suicidal ideation, which strengthened the study in several ways. It provided data on an important indicator of poor mental health within a population whose mental health has not been explored. Suicidal ideation is predictive of suicide, which is an important public health issue globally, and its strongly associated with other cognitive processes such as hopelessness and depression that may make it difficult for MSM to engage in protective sexual behavior and care-seeking. As it is an indication of extreme emotional distress, it may have better

discriminant validity than other indicators of poor mental health, such as depressive symptoms.

Implications for Research

Methods

In the first aim of this study I found that a latent class analysis approach developed an aggregate measure of stigma that revealed three subgroups of MSM and that these subgroups differed both in the severity of stigma experienced and in the types of stigma that were prevalent in each subgroup, reflecting both quantitative and qualitative differences. The use of LCA enabled me to classify subgroups based on patterns of responses and to use the stigma subgroups in a variety of SEM models that assessed the simultaneous interplay of constructs relevant to sexual stigma among Nigerian MSM. This approach has been underutilized to assess sexual stigma and it is hoped that more researchers will assess sexual stigma using LCA in combination with SEM. In terms of measurement, we could not assess the frequency and recency with which participants had experienced sexual stigma nor which experiences may be considered more harmful or salient. More research on these issues would be relevant in terms of understanding which types of sexual stigma may be a priority to address and to assess if chronic exposure to sexual stigma has more harmful impacts than infrequent exposure. The needs of individuals who experienced sexual stigma in the distant past may also be different than those acutely affected. For example, those acutely affected may need immediate referrals to legal aid and homeless shelters

whereas those affected in the past may instead prefer ways to connect with other MSM. In terms of the SEM models utilized, future research could employ newer methods such as the manual three-step method with BCH weights that could account for measurement error in class estimation, prevent auxiliary variables from influencing class estimation, and allow for distal outcomes to be regressed on participant characteristics in addition to the classes being regressed on participant characteristics.[6]

Gender

The strong association between higher stigma and self-reported gender of female or both male and female highlights the need to investigate the meaning of gender within the local context. Although there is a move to distinguish the issues of transgender individuals from that of MSM, it is unclear whether the label of transgender applies for these individuals. Only two individuals in the sample identified their sexual orientation as transgender and while the answer option of transgender is more appropriate under questions of gender and not sexual orientation, it does require a deeper look at whether there may be more appropriate local terminology that would encompass Nigerian sexual minority views of non-male gender. For example, the Yan Daudu is a group of Muslim Nigerians dating back to before colonization who often dress in women's clothes and engage in sex with men but may still consider themselves men and marry women.[7] A gender of both male and female does not currently align with definitions of transgender and yet these individuals had the greatest odds of being in the high stigma class, a finding that needs to be further explored as current research focusing on HIV/AIDS among transgender individuals has focused on individuals who

identify their gender as female. Additionally, these findings highlight the need to better understand the intersection of sexual orientation and gender and perhaps reframing sexual stigma in certain circumstances as gender-based violence may facilitate new research into common solutions for violence towards MSM, transgender individuals, and individuals born with a sex of female.[8,9]

Mental Health

Poor mental health, in the form of suicidal ideation, was found to be a key construct in this dissertation and was associated with engaging in condomless sex and with less HIV testing, both of which contribute directly to onward transmission of HIV and STIs. And yet, no studies that I am aware of have investigated mental health among Nigerian MSM and very few have assessed mental health among MSM in other SSA countries. Studies are needed which assess mental health comprehensively, such as through validated scales on depression, anxiety, suicidality, and other cognitive processes relevant to both mental health and sexual stigma. The parent study did not assess cognitive processes found to contribute to suicidal ideation and attempt, such as self-esteem, problem-solving, and hopelessness.[10,11] A better understanding of the interplay of these factors may help explain which factors are directly or indirectly associated with condom usage and engagement with HIV services and therefore could be targeted with interventions. Although the inclusion of psychosocial support in the form of support groups and peer education has been investigated in the African context,[12–14] more research is needed to understand if psychological counseling from a certified mental health professional would contribute to positive psychological health

above and beyond what can be achieved through support groups, peer education, and HIV counseling and testing. It may also be that some clients do not feel comfortable discussing their experiences of sexual stigma and emotional distress with peers that may be in their broader social networks or in front of groups. The presence of a significant direct effect between sexual stigma and HIV and/or STI incidence also calls for more research into other pathways linking sexual stigma to incidence, such as the role of financial vulnerability. Sexual stigma may result in the loss of or inability to secure employment, which may lead to transactional sex that places individuals at higher risk of HIV and STIs.

Resiliency

Although there are calls to investigate resiliency among MSM, these frameworks have largely not been applied to MSM in SSA. This dissertation mirrors most of the research on MSM in that it does not assess resiliency. Although 59% of the sample experienced elevated sexual stigma approximately a quarter reported suicidal ideation. Similarly, not all participants reported condomless sex or having not had an HIV test. These findings are evidence of resiliency and yet we do not understand what enabled one participant to be resilient in the face of traumatic experiences while another could not. Proponents of resiliency frameworks suggest that HIV prevention work could be more efficacious if it were designed to incorporate naturally occurring resiliencies among MSM and to encourage the development of resiliency where it is lacking, such as fostering the development of hope and connections to family and the sexual minority

community which has been shown to buffer suicidal ideation among sexual minorities.[11,15–17]

Implications for Interventions

Mental Health

The high levels of suicidal ideation among participants in this study is in line with existing evidence finding that HIV and mental illness are frequently co-occurring health conditions. In the US, over 90% of suicides are associated with mental illness or substance use disorders.[18] Nearly half of individuals living with HIV have a psychiatric disorder and between 5-23% of individuals with mental illness are infected with HIV.[19] Poor mental health is predictive of lack of engagement with care and with low adherence to HIV medications.[20,21] But, more attention is needed to address poor mental health among individuals before they are HIV infected. In order to address this gap, mental health-related services should be an important component of any program providing HIV testing and treatment to MSM in Nigeria, including providing access to someone trained to screen for and manage mental illness, substance use disorders, and symptoms of trauma.

Suicidal ideation and behavior is an effort to escape from unendurable pain and reducing the pain is a priority when working with clients who report suicidal ideation.[18] Problem solving pressing and painful problems may successfully reduce the drive towards suicide and skills building through cognitive behavior therapy can teach clients how to manage future suicidal ideation. Dialectical behavioral therapy (DBT) is a

cognitive behavioral treatment that was developed to treat chronically suicidal individuals and DBT skills training modules include training on mindfulness, interpersonal effectiveness, emotional regulation, and distress tolerance. Modified cognitive behavioral therapy has been integrated into some programs targeting high-risk MSM during HIV testing and through social media which have resulted in reduced condomless sex, but they have not reduced symptoms of poor mental health or perceptions of sexual stigma.[22,23] These programs could be adapted to more explicitly address components of DBT, such as mindfulness, and to promote healing from trauma.

One promising approach is to integrate a trauma-informed care approach within MSM-friendly venues that approach sexual minority health holistically. A randomized trial in Zambia found that trauma-focused cognitive behavioral therapy delivered by lay health workers to vulnerable children resulted in reduced trauma and functional impairment scores.[24] In settings of high sexual stigma, especially those where same-sex practices are criminalized, sexual minorities may need venues that are specifically designed to address their needs rather than having them attend health facilities for the general public. These "one-stop shop" HIV clinics could be merged with CBOs with strong ties to the sexual minority community. These centers could explicitly address the intersecting traumas many MSM face, including sexual stigma, HIV-related stigma, and poor mental health by providing 1, training to all staff on trauma, gender, human rights, and the impact of stigma on the health of sexual minorities; 2, routine and universal screening for trauma among all clients that would include safety planning, referrals for community resources, and therapy; 3, psychosocial support on-site that builds social cohesion within the sexual minority community, addresses cases of serious

psychological distress including recent suicidal ideation, improves coping skills, and facilitates the development of resiliency; and 4, services that minimize the retraumatization of clients by including processes that respect privacy and confidentiality as well as patient choice.[25,26] Services should also include after-hours suicide lines such as telephone hotlines or online services.[27] Interventions via social media may be of especial utility as the use of the internet for seeking sex partners has been found to be high among Nigerian MSM and these individuals were more likely to have experienced sexual stigma.[28]

Personal Contact

Another important approach to reducing sexual stigma is to be strategic about interactions with the general public and with important stakeholders. Part of what has made countries such as the US more accepting of sexual minorities in such relatively short spans of time is their greater visibility in society and the frequent personal contact between heterosexuals and sexual minorities.[29,30] Having a close friend or relative who is a sexual minority has been shown to be an effective barrier to stigma because sexual stigma interferes with the goal of maintaining the relationship and personal contact can be a source of sexual stigma-reduction skills in which heterosexual individuals learn a new set of automatic responses and develop positive emotions and beliefs.[30] Research in multiple countries has suggested that family treatment of sexual minorities is an especially important factor in their well-being and family support may be even more important in societies which privilege family lineage.[31–33] Additionally, family support and intervention have been found to be critical in preventing suicidal

behaviors.[18] Therefore, facilitating disclosure and close relationships between sexual minorities and their families, the police, health providers and governmental agencies could be especially effective at reducing sexual stigma in Nigeria. For example, the community-based organization Transgender Education and Advocacy in Kenya facilitates consultations between transgender individuals and their families, service providers, and other relevant stakeholders to increase understanding and to reduce sexual stigma.[34] Within the Nigerian context, such consultations should be conducted only after having a safety plan in place. Given the criminalization of same-sex practices in Nigeria, legal and mental health services may be necessary following an incident of sexual stigma in response to disclosure by an individual of their sexual orientation or sexual practices.

Policy

Interventions at the policy level are also very important. Decriminalization must be pursued as it directly contributes to sexual stigma and inhibits sexual minorities from disclosing to heterosexual individuals, accessing services, and from being able to support their peers. In working to improve the health of Nigerian sexual minorities, researchers, practitioners, and policy makers external to Nigeria should routinely consult Nigerian sexual minorities and their community-based organizations as to which actions are most helpful and to seek assistance thinking through potential unintended consequences.[35] For example, a coalition of organizations in Uganda published guidelines for their local and international allies for how to best fight against the country's new Anti-Homosexuality Law.[36] In that list, there were a number of

recommendations relevant to policy including making strategic aid cuts rather than general aid cuts, greater investment in funding targeting sexual minorities, adjusting asylum policies in order to welcome more sexual minorities from countries in which state-sponsored sexual stigma is rising, and having more international aid groups such as USAID speak out against criminalization. The US should fund more programs and research aimed at reducing sexual stigma, such as the USAID-funded trial in Zambia that found trauma-focused cognitive behavioral therapy to be effective[24] and another USAID-funded program in Vietnam where programming is designed to address individuals' well-being holistically including screening for anxiety and depression and providing yoga classes to clients.[37]

Conclusion

This dissertation adds to the growing body of evidence that demonstrates that sexual stigma is associated with poor health outcomes and less access to HIV services. It also strengthens it in several ways including: 1, sexual stigma was conceptualized as a latent variable using person-centered statistical methods that resulted in a nuanced measure that revealed subgroups at greatest risk of experiencing sexual stigma; 2, this sexual stigma measure was directly and indirectly associated with robust measures of HIV and STIs, revealing multiple points of intervention; and 3, suicidal ideation was found to be a critical factor in the harmful pathways between sexual stigma and HIV, STIs, and lower engagement with HIV testing. This dissertation suggests a number of potential sexual stigma mitigation interventions including the integration of mental

health services within HIV programming across the continuum from being HIV negative to having a suppressed HIV viral load. But, in order to have the greatest impact, interventions to address sexual stigma among Nigerian sexual minorities must be community-led and Nigeria-centered.

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Mumbai, India: Findings from a community-recruited sample. *Psychol Health Med*. 2012;16(4):450-462.
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Curriculum Vitae

Birth date 2/27/82, born in Madison, WI

Education

Johns Hopkins Bloomberg School of Public Health 8/2013 – 12/2016 Baltimore, MD
- PhD in the Health, Behavior and Society Department

University of California Los Angeles 9/2008 – 6/2010 Los Angeles, CA
- Masters of Public Health (MPH) in the Community Health Sciences Department

Brown University 9/2000 – 5/2004 Providence, RI
- Bachelor of Arts in Egyptology

Professional Experience

TRUST/RV368 Study 2/2014 – present Baltimore, MD
Institute of Human Virology, University of Maryland Baltimore School of Medicine
Research Assistant
- TRUST/RV368 is a prospective cohort study that utilizes respondent driven sampling to recruit men who have sex with men (MSM) in Nigeria into a comprehensive model of HIV prevention, treatment and care services.
- Assessed the practice of harm reduction behaviors (serosorting and sexual positioning) among MSM, patterns of stigma across participants, and how stigma impacts HIV infection, STI infection, and HIV testing.
- Designed and conducted a qualitative study to further explore the impact of stigma on the health of MSM in Abuja, Nigeria.

Teaching Assistant 1/2016 – 3/2016 Baltimore, MD
Johns Hopkins Bloomberg School of Public Health
Teaching Assistant for Global Perspectives on Lesbian, Gay, Bisexual, and Transgender Health
- Designed course content, reading list, and led class discussions with the course professor for a new class that was the first at the Bloomberg School of Public Health to focus on LGBT health on a global scale and resulted in the course professor nominating me for a teaching assistant award. I also designed and delivered a lecture on stigma and its impacts for MSM.

Stiletto Study 7/2014 – 1/2015 Baltimore, MD
Johns Hopkins Bloomberg School of Public Health
Research Assistant
- The Stiletto Study was a study assessing socio-demographic characteristics, drug use, sexual practices, and occupation risks of exotic dancers in dance clubs in Baltimore, MD.

- Conducted recruitment, interviewing, and assisted dancers in the self-collection of swabs for chlamydia and gonorrhea testing, in addition to doing follow-up assessment with previously interviewed dancers.

Behavioral Surveillance Research (BESURE) Study 6/2014 – 4/2015 Baltimore, MD
Johns Hopkins Bloomberg School of Public Health

Research Assistant

- The BESURE Study is the Baltimore site for the National HIV Behavioral Surveillance (NHBS) Study, which is a CDC-funded study to measure HIV prevalence, risk behaviors, testing behaviors, and access to prevention services over time among individual at high risk for HIV infection.
- Conducted recruitment, interviewing, and HIV testing and counseling to MSM at a variety of venues, including dance clubs, bars, gyms, and parades.
- Conducted a formative evaluation to assess reasons for why Latinos living in Baltimore participate in low rates in the BESURE Study and ways the study could improve its operations to make it more accessible and welcoming of Latinos.

Sexually Transmitted Disease (STD) Section 8/2013 – 7/2014 Baltimore, MD
Florida Department of Health

Consultant

- Led the evaluation of the Florida STD Texting Project, the first published evaluation of a state-wide initiative to deliver STI test results to clinic patients via text message and later awarded a David Productivity Award by the Governor of Florida, Rick Scott.
- Led an analysis of three large MSM sexual networks in Orlando, FL, which has resulted in a better understanding of how to integrate social network analysis into traditional STI programmatic work to order to improve sexual health outcomes for MSM in Florida.

Public Health Prevention Service Fellowship 10/2010 – 8/2013
Atlanta, GA; Tallahassee, FL
Centers for Disease Control and Prevention (CDC)

Fellow

- Sexually Transmitted Disease Section, Florida Department of Health, 10/2011 – 9/2013
  - As the Statewide STD Texting Project Coordinator, I served as the project lead to Florida counties adopting the use of text messaging for results notification and provided technical assistance on implementation and evaluation.
  - Lead author of a successful application for a 1.5 million dollar grant to be one of 12 CDC-funded Centers of Excellence for STD Surveillance.
  - Served on a CDC objective review panel reviewing applications for projects to improve immunization capacity through improvement of vaccine management, storage and handling.
  - Carried out HIV testing and risk assessments with the homeless while deployed to Jacksonville, Fl, during the health department's efforts to contain a tuberculosis outbreak.
- Policy Office at the National Center for Immunization and Respiratory Diseases (NCIRD), 4/2011 – 9/2011
  - Created a document for the Center Director outlining the NCIRD's global activities and making recommendations for ways the center could improve communication with the Center for Global Health, strengthen Office of the Director support of global activities within the center, and better represent the center's global activities within the broader CDC global agenda.

- Served on a CDC objective review panel reviewing applications for projects to reduce sexually transmitted infections through community-based collaborations between health departments and their partners.
- While participating in an Epi Aid in Chicago to investigate an outbreak of rotavirus in a large retirement community, I assisted with the sample design, data collection, data entry, analysis, and report writing.

- Sudden Unexpected Infant Death Initiative, 10/2010 – 4/2011
  - Lead the creation of a clearance package for an outcome evaluation of infant death scene investigation trainings conducted by the CDC from 2006 to 2008 for approval by the Office of Management and Budget.
  - Designed an evaluation plan for a proposed CDC training to improve communication between medical examiners/coroners and bereaved families.
  - Assisted in the design and writing of an article on the prevalence of soft bedding in infant sleep environments in the U.S.

University of California Los Angeles 7/2010 – 10/2010 Los Angeles, CA

Research Assistant

- Coordinated the submission of a research protocol to the Los Angeles Department of Health Institutional Review Board and assisted in creating a codebook for a qualitative study assessing the prevalence and risk factors associated with rectal STIs among women.

Bixby Research Mentorship Program 12/2009 – 9/2010 Los Angeles, CA

Research Fellow

- Mentored by Peter Kerndt, MD, MPH, then Director of the Los Angeles Department of Public Health STD Program (STDP).
- Designed, implemented, and analyzed a study assessing multi-site gonorrhea and chlamydia infections among adult film performers attending a community clinic.
- Co-wrote a policy statement in support of improved safety in the adult film industry that was adopted by the American Public Health Association (APHA) on November 7, 2010.
- Facilitated meetings between the STDP and community stakeholder groups, such as Film LA, the LA Times, and labor organizations, in order to build an advocacy coalition.
- Led the planning team for a Strategy Symposium, in which 50 individuals from across California participated with the goal of improving safety on adult film sets.
- Participated in a work group to redraft and improve pending legislation to improve health and safety during adult film productions.
- Spoke on behalf of improving worker health in the adult film industry at a variety of public speaking events, including a press conference, Los Angeles County Board of Supervisors meeting, and at Cal/OSHA hearings.

Family Health International (FHI) Nepal 6/2009 – 9/2009 Kathmandu, Nepal

Summer Intern

- Evaluated FHI-funded clinical and community-based services provided to female sex workers in the Kathmandu Valley and provided recommendations on how they could be improved in order to increase uptake of services by sex workers.
- Carried out a site visit to an FHI-funded Prevention for Positives community-based organization in northern Nepal in order to evaluate its achievements with local HIV positive clients.
- Evaluated early successes of the FHI Prison Prevention Program in order to write a report to justify expanding the program.

Travelers Aid Society of Los Angeles 7/2006 – 10/2007 Los Angeles, CA

Health Education and Outreach Worker

- As part of an Office of AIDS Programs and Policy grant, I carried out street outreach targeting men who have sex with men and women (MSMW) and women at sexual risk (WSR) in order to assess their risk of contracting HIV and other STIs and to create action plans with them outlining how they could reduce their risk of acquiring an STI.
- Conducted HIV/AIDS and STI health education workshops with homeless shelters, drug and prison rehabilitation centers, and schools throughout Los Angeles.

Rhode Island Hospital's Dept. of Psychiatry 12/2004 – 6/2005 Providence, RI
Childhood Asthma Research Program

Research Assistant

- As part of a pediatric asthma study, I recruited participants, administered a pediatric asthma study protocol and assisted with data input and maintenance.

Awards and Grants

- **AIDS 2016 Conference Scholarship**
  In April 2016, I was awarded a full scholarship to attend the 21st International AIDS Conference in Durban, South Africa from July 18-22, 2016. I was chosen for a scholarship out of more than 7,500 applicants.

- **Health, Behavior and Society Teaching Assistant Award**
  In April 2016, I was awarded a Health, Behavior and Society Teaching Assistant Award by my department for the work I did as the TA of a new class called Global Perspectives on Lesbian, Gay, Bisexual, and Transgender Health.

- **Johns Hopkins University Urban Health Institute Trauma Grant**
  In the summer of 2015, I partnered with the Men and Families Center, a community based organization serving low-income resident of East Baltimore, to write a grant to support a project to develop a trauma training for staff and youth. They were awarded $5,000 for a one-year pilot project.

- **STI Training Grant**
  In December 2014, I was accepted to the NIAID STI Pre-doctoral Training Grant (T32) for a period of 1.5 years to support my dissertation research, which covers tuition, fees, and an annual stipend. As part of this award I co-coordinate a monthly STI journal club that brings in experts in STIs and HIV to discuss promising research in the field with students and faculty at Bloomberg School of Public Health.

- **Johns Hopkins University Center for AIDS Research (CFAR) travel award**
  In November 2014, I was awarded $1,500 by the Johns Hopkins Center for AIDS Research to travel to the 2015 Conference on Retroviruses and Opportunistic Infections (CROI) and present on harm reduction practices among Nigerian MSM.

- **HBS special project funding**
  In October 2014, I was awarded $2,000 in special project funding by the Johns Hopkins Bloomberg School of Public Health to enable me to attend Spanish classes in Ensenada,

Mexico in order to conduct a formative evaluation in Baltimore, MD with Latinos and Latino-serving organizations, exploring how the BESURE study could improve its outreach to Latino individuals at risk of HIV infection.

- **Division Shining Star**
  In August 2013 I was nominated by the Florida Department of Health STD Section to be the Florida Department of Health Division of Disease Control and Health Protection's Shining Star and was selected for the award. The Shining Star is a division-wide award given to outstanding employees.

- **Davis Productivity Award**
  In June 2013, a team of Florida Department of Health employees from Duval County, Clay County, Seminole County, and the STD Section were awarded a Prudential-Davis Productivity Award for the Florida STD Texting Project that I coordinated. This award is given annually by the Governor of Florida to publically recognize state employees whose work significantly and measurably increase productivity and promote innovation to improve the delivery of state services and save money for Florida taxpayers and businesses.

- **SSuN Grant**
  In May 2013, I was the lead author of an application for the CDC-funded STD Surveillance Network cooperative agreement (CDC-RFA-PS13-1306). The Florida STD Section was selected to be one of 12 Centers of Excellence for STD Surveillance in the US and awarded $1,500,000 over five years.

- **COPPI QI Award**
  In December 2012, a team of Seminole County Health Department employees and I were awarded the Strengthening the Community of Practice for Public Health Improvement Quality Improvement Award by the National Network of Public Health Institutes. We were given $5,000 and a quality improvement coach to support a process of expanding the option of receiving STI test results through text message to the family planning and prenatal clinics in Seminole County.

- **California HIV/AIDS Research Program Grant**
  In January 2011, a team, consisting of myself and colleagues at University of California Los Angeles and the Los Angeles Department of Public Health STD Program, were awarded $200,000 for a two-year study to assess HIV/STI-related risk behavior among adult film performers for which I led the design and writing of the proposal.

Publications

- **Rodriguez-Hart C**, Hongjie Liu, Rebecca G. Nowak, Ifeanyi Orazulike, Sam Zorowitz, Trevor A. Crowell, Stefan D. Baral, William Blattner, Man Charurat. Serosorting and sexual risk for HIV infection at the ego-alter dyadic level: an egocentric sexual network study among MSM in Nigeria. *AIDS and Behavior*. 2016; [Epub ahead of print].
- **Rodriguez-Hart C**, Gray I, Kampert K, White M, Wolfe C, Wilson M, Cooksey A. Just text me! Texting sexually transmitted disease clients their test results in Florida, February 2012-January 2013. *Sexually Transmitted Diseases*. 2015; 42(3): 162-167.

- **Rodriguez-Hart C**, Chitale R, Rigg R, Goldstein B, Kerndt PR, Tavrow, P. Sexually Transmitted Infection Testing of Adult Film Performers: Is Disease Being Missed? *Sexually Transmitted Diseases*. 2012; 39(12): 989-994.
- Cardemil CV, Cortese MM, Medina-Marino A, Jasuja S, Desai R, Leung J, **Rodriguez-Hart C**, Villaruel G, Howland J, Quaye O, Tam KI, Bowen MD, Parashar U, Gerber S. Two Rotavirus Outbreaks Caused by Genotype G2P[4] at Large Retirement Communities. *Annals of Internal Medicine*. 2012; 157(9): 621-W204.
- Engeran-Cordova W, Kerndt P, **Rodriguez-Hart C**, Steinberg J, Tavrow P. Safe sex sells: Why the adult film industry needs to better protect its performers. 2009. *Forbes.Com*. Available at: http://www.forbes.com/2009/12/22/safe-sex-adult-film-industry-opinions-contributors-hart.html. Accessed February 24, 2011.

Conferences

- **Rodriguez-Hart C**, Rebecca G. Nowak, Rashelle Musci, Danielle German, Ifeanyi Orazulike, Uchenna Ononaku, Hongjie Liu, Trevor Crowell, Stef Baral, Man Charurat. Stigma Associated with HIV/STI Incidence Among Nigerian Men Who Have Sex With Men. Poster to be presented at the Conference on Retroviruses and Opportunistic Infections (CROI), Seattle, WA, February 13-16, 2017.
- **Rodriguez-Hart C**, Rashelle Musci, Rebecca G. Nowak, Ifeanyi Orazulike, Uchenna Ononaku, Trevor Crowell, Stef Baral, Man Charurat. Stigma towards men who have sex with men in Nigeria and its impact on sexually transmitted infections. Poster presentation at the 2016 STD Prevention Conference, Atlanta, Georgia, September 20-23, 2016.
- **Rodriguez-Hart C**, Rashelle Musci, Rebecca G. Nowak, Ifeanyi Orazulike, Uchenna Ononaku, Trevor Crowell, Stef Baral, Man Charurat. Stigma towards men who have sex with men in Nigeria: novel methods and wide-ranging impacts for HIV, sexually transmitted infections, and mental health. Poster presentation at the 21st International AIDS Conference, Durban, South Africa, July 18-22, 2016.
- **Rodriguez-Hart C.** Stigma Towards Men who Have Sex with Men in Nigeria: Patterns, Predictors, and Outcomes. Presented at the Johns Hopkins Bloomberg School of Public Health LGBT Health Research Retreat, Baltimore, MD, March 25, 2016.
- **Rodriguez-Hart C.** Conflicting Findings from a Preliminary Analysis of Social Capital among Nigerian Men who Have Sex with Men. Presented at the Johns Hopkins Bloomberg School of Public Health LGBT Health Research Retreat, Baltimore, MD, April 16, 2015.
- **Rodriguez-Hart C**, Hongjie Liu, Nowak R, Orazulike I, Zorowitz S, Adebajo S, Hughes L, Baral S, Robb M, Blattner W, Charurat M. The Use of Seroadaptive Strategies of Sexual Positioning and Serosorting by MSM in Nigeria. Presented at the Conference on Retroviruses and Opportunistic Infections (CROI), Seattle, WA, February 23-26, 2015.
- **Rodriguez-Hart C**, Gray I, Kampert K, White M, Wolfe C, Wilson M, Cooksey A. Evaluation of the Florida STD Texting Project for client notification of test results. Presented at the 2014 National STD Prevention Conference, Atlanta, GA, June 9-12, 2014.
- **Rodriguez-Hart C**, Gray I, Kampert K, Cohen L, Cooksey A. A Social Network Analysis of Contact Tracing Data Reveals Strategies to Improve Contact Tracing

Protocols. Poster presentation at the 2014 National STD Prevention Conference, Atlanta, GA, June 9-12, 2014.

- **Rodriguez-Hart C**, Cooksey A, White M, Shiver S. The Florida STD Texting Project. Presented at the Youth Technology and Health Live Conference, San Francisco, CA, April 7-9, 2013.
- **Rodriguez- Hart C**, Cooksey A, White M, Shiver S. Implementation of the STD Texting Project – Florida, 2011-2012. Presented at the Centers for Disease Control and Prevention's 2012 Public Health Leadership and Practice Training Institute, Atlanta, GA, June 20-22, 2012.
- **Rodriguez-Hart C**, Wilson M, Andress D, Richardson C, White M, McLaughlin G, Seaman L, Shiver S. Text Message Notification for Bacterial STD Diagnosis: A New Policy. Poster presentation at the National STD Prevention Conference, Minneapolis, MN, March 12-15, 2012.
- **Rodriguez-Hart C**, Rigg R, Chien M, Aynalem G, Kerndt PR. Adult Film Industry Workers: High Burden of Oral Pharyngeal, Rectal and Urethral/Vaginal Gonorrhea and Chlamydial Infections. Poster presentation at the APHA 139th Annual Meeting and Exposition, Washington DC, October 29-November 2, 2011.
- Goldstein B, **Rodriguez-Hart C**, Aynalem G, Kerndt PR. High Chlamydia and Gonorrhea Incidence, Reinfection and HIV Infection Among Workers in the Adult Film Industry: Time to Regulate and Protect Workers. Poster presentation at the 19th International Society for STD Research Conference, Quebec City, Canada, July 10-13, 2011.